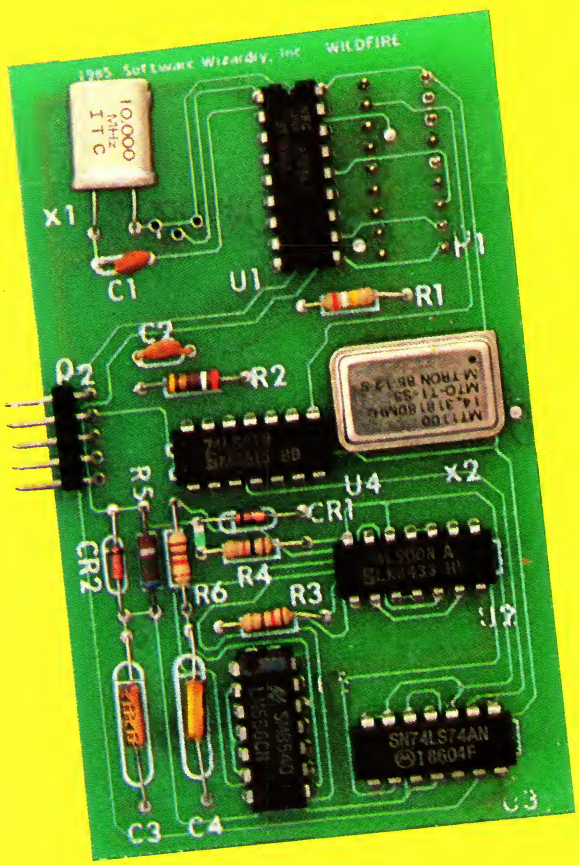
For Users of Heath/Zenith Computers

Special Fifth Anniversary Section

SEXTANT

Issue No. 27 March-April 1987 $2.95



Wildfire Speeds Up the '150 and '160

22 Utilities for the '100 and '150

IBM Emulation With HUG's ZPC

WRHUGCON 3: HUGgies in Disneyland

Build a Clock/Calendar for Your '89

Photo by Charles Floto

8 Want to give your '151, '152, or '161 the speed of a '158? Software Wizardry has the solution, complete with a speed switch for the front panel.

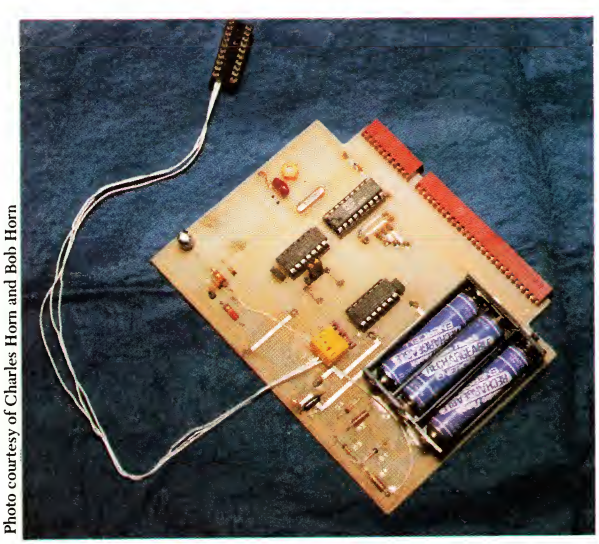


Photo courtesy of Charles Horn and Bob Horn

80 Here's a clock board you can build for your H/Z89. A major design goal was economy.

SEXTANT

Features

Wildfire Speeds Up the '150 or '160 to Match the '158
Charles Floto 8

WRHUGCON 3: HUGgies in Disneyland
Kieran P. O'Leary 13
Heath/Zenith users held a town meeting last November at the Disneyland Hotel. There was something new for everyone.

Z100 Notebook
William N. Locke 20
Did you know you can hook a mouse to a Z100, or display 48 lines of text on the screen? Or maybe you're looking for a graphics program or clock/calendar for your computer. Four products are checked out. The Code Corner meddles with the connection between the characters on the keyboard and the ones that show up on the screen.

The PUP Utilities: Zenith's Useful Tools for the '100, '150, and '200
William M. Adney 32
The Programmer's Utility Pack includes 22 utilities for MS-DOS 3. Some of them might do *you* some good. Let's find out what they are and how you can use them.

The Eight-Bit World
Walter J. Janowski 38
Here's one eight-bit user's perspective on what's happened during *Sextant*'s first five years. Plus: options for distributing HDOS 3; another look at 96-t.p.i. disk drives; BOOT and FORMAT options; disk cataloging; and some miscellaneous comments.

Issue #27
March-April 1987

IBM Emulation With HUG's ZPC
Wayne Rash, Jr. 42

You don't necessarily have to spend a lot of money to get your H/Z100 to run software written for the IBM Personal Computer. The Heath/Zenith Users' Group offers a software approach to the quest for IBM compatibility. ZPC does have some advantages in addition to economy, but it may require significant ingenuity to make it work with some software products.

C Notes
Joseph Katz 48

The spotlight is on the '150 and '200 series of computers, and on some C software that can fiddle with their RAM in the interest of flexibility.

Build a Clock/Calendar for Your '89
Charles Horn and Bob Horn 80

Departments

The Editorial Eye	2
Letters	4
Z100 Notebook	20
The Eight-Bit World	38
C Notes	48
Index to Advertisers	78
Supplier Notes	90
Classified Ads	92

Cover photo by Charles Floto

Special Fifth Anniversary Section

Prologue
John Walker 54

Diverse Writers; Mixed Views
John Walker 56

They each wrote at least two articles for *Sextant* during our first five years. Why? What do they think of the changes in the Heath/Zenith world during that time?

Vendor Strategy: Growing by Adapting
Victoria Saxon 60

They've been advertising in *Sextant* since our first year. How have they changed? And what changes have they seen in their marketplace?

Checking Up on the Charter Subscribers
John Gill 66

Some of our original subscribers let off steam about the events of the past five years in Heath/Zenithdom.

Epilogue
John Walker 70

Index to *Sextant* #1–#26
72

Our first five years of articles—arranged by subject matter. This index covers the issues from Spring 1982, when we started as a quarterly, through January-February 1987.

The Editorial Eye

Photo by Charles Floto

January 1 to April 15 is a traditional time to balance the pluses and minuses of the previous year, and to make plans for the year ahead. This year *Sextant* is taking a somewhat longer view in celebration of our fifth birthday. We've certainly noticed some changes over the years. So we decided to contact those who'd been with *Sextant* from the beginning, and get their views.

The first issue of *Sextant* came off press in March of 1982—just hours before the opening of the West Coast Computer Faire. So we arranged to have issues sent to San Francisco by air freight. Unfortunately, the airline lost track of the container holding our shipment. It did show up the second day of the Faire. But not before we'd been reminded how interesting the magazine business can be.

I'm sure the airline had no intention of keeping our issues from us. Things do go wrong in this world even when all the individuals involved are acting without malice. Often, the biggest step in getting matters straightened out is for everyone involved to realize that a problem exists. If you don't know it's broke, you don't fix it.

In putting together our Fifth Anniversary Section (pages 54-79), it became clear that some Heath/Zenith users do feel there are problems. We welcome your reaction to their comments, and to the issues they raise.

We'll be taking a broader look at issues facing the Heath/Zenith community in the September-October *Sextant*, which will mark the tenth anniversary of Heath's first digital computer, the H8. If you'd like to participate in the reader survey we'll be conducting for this tenth anniversary section, please circle number 161 on the Reader Service Card facing page 78.

Actually, *Sextant* can trace its roots back *ten* years—to the First West Coast Computer Faire in April of 1977. It was there that I distributed an 8.5"x11" piece of paper purporting to be issue 1 of *Buss*. "The Independent Newsletter of Heath Co. Computers" grew in circulation, number of pages, and frequency of publication—to the point that it became a full-time job for me in September of 1980. I'd already hired Pam Juram to help with *Buss*. Together we put together the early revisions of an expanding directory of independent suppliers serving Heath computer users. By early 1981, Pam was selling advertising space in the directory. That spring, we decided our contacts with subscribers and advertisers should be used to start an "independent magazine for the entire Zenith computer community."

Thus, while March is my fifth anniversary publishing *Sextant*, April is my tenth anniversary as editor of *Buss*. I wonder how many other people have held the same position in the microcomputer world for a decade. What were you doing in the spring of 1977? Expecting the birth of your first child? Looking forward to your 14th birthday? Or waiting for Heath Company to announce the details of its first digital computer kit? *Buss* provided a preview then, just as it gave readers a description of the Z181 in March of 1986—two and a half months before it was officially unveiled.

Heath/Zenith computers depend on a bus for the internal transfer of information. Likewise, the Heath/Zenith *community* has used *Buss* to carry news of new products, hardware modifications, software bug fixes, reports of users' experiences with their systems, and meeting announcements. The newsletter is mailed first class 20 times a year—usually eight pages per issue. *Buss* is a means of information transfer: I don't attempt to tell the readers much more than they tell me. Fortunately, with 6,000 inputs the newsletter represents a more significant output than I could provide alone.

Charles Floto

SEXTANT®

Charles Floto
Editor
Publisher

John Gill
Assistant Publisher

Elizabeth Saxon-Giles
Managing Editor

John Walker
Technical Editor

Dana F. Lombardy
Advertising Manager

Gabriele Burkhard
Circulation Assistant
Production Assistant

Kieran O'Leary
Retail Sales Manager
Production Assistant

Beverly Voigt
Editorial Assistant
Production Assistant

Deborah L. Peel
Office Assistant

Edward A. Byrnes
Contributor

Walter J. Janowski
Contributor

Joseph Katz
Contributor

William N. Locke
Contributor

Subscription Service 202/544-0900
Advertising Inquiries 202/544-2868
Authors' Inquiries 202/544-2867
Charles Floto 202/544-0484

Sextant (ISSN 0731-2180) is published bimonthly by Sextant Publishing Co., 716 E Street, S.E., Washington, DC 20003. Second-class postage paid at Washington, DC and at additional mailing offices. POSTMASTER: Send address changes to Sextant, 716 E Street, S.E., Washington, DC 20003.

Copyright© 1987 by Sextant Publishing Co. All rights reserved. No part of this publication may be reprinted or otherwise reproduced without written permission from the publisher. Printed in the U.S.A. by Waverly Press, Inc., Easton, Maryland 21601.

Subscription rates: 6 issues (1 year) in U.S.—$14.97; in Canada and Mexico—$17.25; overseas—$21.00. Payment accepted by check in U.S. dollars payable on a U.S. bank, by U.S. and international postal money order, and by Visa and MasterCard. Please allow six to eight weeks for delivery.

"Heath" and "Heathkit" are trademarks of the Heath Company. "CP/M" is a trademark of Digital Research. "Unix" is a trademark of AT&T Bell Labs.

NOT COPY PROTECTED
Guaranteed†

Genie™

Version 3
The Productivity Tool

Genie comes with these features:

- **ALARM CLOCK** – Pop up window alarms, *Countdown timer, stopwatch, *hourly chime, on *screen clock, *links to CALENDAR.
- **CUT and PASTE** – Moves data from ANY screen into ANY other application. Also: *Multi speed paste *End of line macro, *ASCII only mode, Numeric & blank processing, *pastes text files too.
- **CALENDAR** – *Displays two months at a time, *single keys move from day to day, month to month or year to year, *variable appointment times, *daily diary, *auto appointment insert, find, *delete, multiple calendars, print out.
- **ROLOFILER** – Stores complete name and address info. Search on any field, print labels in your format, *DIALS YOUR (ANY) MODEM, *speed dial list for easy access.
- **KEYBOARD MACROS** – *Macros by example (record as you type), multiple macro files, edit macros, *define keys by name e.g., <Ret>, control keyboard click, *set macro playback rate, *timed wait and, *user input macro commands for variable macros.
- **NOTE PAD** – Variable window, buffer, *independent margins, *change window size any time, no limit on file size, *one key save *function key and menu driven, undelete, much more.
- **CALCULATORS** – Floating point now with *print option, accuracy to 9 decimal places, adding machine style input for quick entry of numbers, send result to other programs. Integer calculator with hex/octal/decimal and many programmer functions.
- **DOS SERVICES** – Manages your disks. Delete, copy, display directories, search for a file name anywhere on a hard disk, and perform other file maintenance functions.
- **ASCII TABLE** – Finds ASCII codes in Hex/Octal also includes names of control characters, and graphic extensions.
- **TYPEWRITER** – Sends data directly to your printer, even special printer commands.
- **SCREEN SAVER** – Automatically shuts off your screen display to prevent phosphor burn in, manual shut off, manual disable, variable time shut off.
- **SPUFFER** – Printer spooler and buffer captures up to 64K of printer output so your program can continue and not wait for the printer, spools up to 10 files to be printed in order, formats file printout, writes printer output to disk. *Now Included*
- **SCIENTIFIC CALCULATOR** – Includes high accuracy, RPN, full scientific functionality: trig functions, logarithmic functions, etc. Statistical functions. *Now Included*

*feature new in this version of Genie.

Any or all of these functions can be accessed at any time, and from any application program. Whether you use your PC for its word processing, terminal emulation, spread sheets, databases, or to program Genie will not only increase your productivity – it will make your life easier.

When you purchase Genie you get the full functionality of a powerful productivity tool that integrates the best in state of the art software:

- **WINDOWING** – Genie uses the latest and most sophisticated user friendly interface, integrating menus and windows.
- **MENU DRIVEN** – Genie is very friendly and easy to use.
- **FLEXIBLE** – Only load the pieces you need and use – tailor Genie to your own system and configuration. Save valuable memory.
- **COMPREHENSIVE DOCUMENTATION** – Genie comes with a 182 page manual loaded with examples to help you make full use of the power and flexiblity of Genie and a QUICK GUIDE for advanced users.
- **LESS MEMORY** – This version of Genie requires less memory than ever before. We have added features, and still reduced the size of the modules.
- **EASY INSTALLATION** – Genie comes with an installation program that configures the entire Genie system to your needs.
- **COMPATIBILITY** – Genie works with more applications and is compatible with many other memory resident programs.
- **Works with EGA and Enhanced Keyboard.**

Here are some actual quotes from a few of the thousands of satisfied Genie customers:

"I am recommending that we purchase Genie as one of our basic software packages to be installed with each PC." – M.P., Information Center, K mart Corp.

"Excellent product." – R.T.

"Superb support!!" – R.I.

"I've been using Genie for over a month and I'm still very, very pleased with its performance." – D.P.

"Genie may be the best and most used piece of software that I own." – M.T.T.

System requirements: IBM-PC or 100% Compatible with at least 256K of memory (384K recommended.) Color, Monochrome, or EGA.

Helix Software Co. Inc.
452 West 47th Street
New York, NY 10036
(212) 247-0150

ORDERS ONLY CALL: 1-800-437-4400 X800 or clip & mail:

Please RUSH me ___ copies of Genie at $99.95 each.

☐ M/C ☐ VISA ☐ Check Expires on:
Card #
Name:
Company:
Address:
City/St/Zip:
Tel: ( )
Computer Model/Brand:

please add:
$5 per order shipping in US.
$15 per order outside US.
NY residents add 8¼% tax.

† If, within 30 days of purchase, you find Genie does not work in accordance with our claims, call our customer service department. We will gladly fix your Genie, or give you a full refund.

Note: Advertisement applies to the IBM-PC and compatibles version only. Features/offers differ in other versions.

IBM-PC is a trademark of IBM Corporation, K mart is a trademark of K mart Corporation.

Circle #210 on Reader Service Card

Letters

Unix not from Digital

In Walter Janowski's ["Eight-Bit World" column in *Sextant* #26], he made a grave and serious error when he referred to Unix as belonging to Digital Equipment Corp.

Unix never has belonged to Digital. It was developed by the Bell Laboratories, Inc., and is still their property, even though the University of California (Berkeley) has modified it. The bsd version of Unix is the one that most people use.

Digital Equipment Corp., however, is the developer and owner of Ultrix, a powerful operating system based on the Unix operating system, with some of the user-friendliness of Digital's VMS and our own HDOS.

I suggest you remind Mr. Janowski of his rather glaring error and mention something in your next editorial about it.

Please keep up the informative articles about H/Z products and developments, and I will continue to subscribe.

David Orosz
Palo Alto, CA

That certainly was *a grave and serious error—but it wasn't Walt's! It was* Sextant's. *The finished copy referring to J. Gordon Letwin should have read: "It's always seemed as if he had his eye on more powerful operating systems such as Unix* and *Digital Equipment Corp.'s operating systems when he was writing HDOS."*

During editorial changes, the "and" got lost. As noted at the bottom of our masthead on page 2, "Unix" is a trademark of AT&T Bell Labs.

John Walker, Technical Editor

"C Notes" not just for C users

I read magazines such as *Sextant* and *REMark* because I love to tinker. Both these publications offer hands-on techniques, tricks, and wizardry dealing with my hobby—Heath/Zenith computers. I read magazines such as *Computer Language* and *Dr. Dobbs' Journal* because they explore the theoretical boundaries of my livelihood—computers. Mr. Joe Katz's "C Notes" column in the November-December issue [of *Sextant*] caught my eye, not because of my interest in C (very little), but because of the underlying topics of assembly language interface and the use of software tools.

Perhaps without realizing it, Mr. Katz has summarized a great deal of current software engineering practice (as opposed to theory) regarding the use of machine-dependent (read assembly language) routines in coding software systems. The current practice is that, when indeed assembly language is needed, it should not be feared; rather, it should be managed with a close eye regarding impact on portability. Assembly language seems to be going through a phase somewhat akin to the famous GOTO wars. First it was considered great, then terrible; now it is realized that, used and managed properly, assembly language can be a great asset. Mr. Katz wisely cautions the readers to use judgment and not let things get out of hand if portability of code is an issue. It is experience and judgment that turn an intermediate programmer into an advanced programmer, not merely the use of assembly language. The original Unix operating system for the PDP-11 was written entirely in C, with the exception of approximately 500 lines of low-level assembly. Were these people "intermediate"?

Once the decision to use assembly language has been made, how it is to be managed becomes the question. Since assembly routines are normally standalone entities (for such things as clearing the screen, ringing the bell, etc.), libraries are an ideal place to "containerize" them. Studies have shown that an efficient librarian system, capable of interfacing with many different compiler/assembler output modules, significantly reduces programmer time for a project. Common routines are written for handling the screen, reading/writing disk data, etc., which are used by all. This cuts out reinvention of the wheel, and has the added benefit of easier program maintenance. (*Every* program has bugs in the beginning.)

The librarian is only one of a whole class of software tools aimed at speeding program development and reducing the chance of error creeping into the system. (We're only human.) Another such tool is the symbolic debugger. Without one, the programmer must mentally track each section of program code, often utilizing the PRINT or WRITELN statement to display key variables while the program is running. This is an inefficient use of time at best. First, you must edit the code to add the display statements, then recompile (twice—you forgot a semicolon), relink, and finally run with test data, only to find that you asked for the wrong variable to be displayed. With a symbolic debugger, the programmer is able to actually *see* what the program is doing, what is stored at *any* variable (by name). From personal experience, a good symbolic debugger can speed testing and debugging by a factor of at least ten.

I found Mr. Katz's column enjoyable even though I am not really interested in C. The concepts he presents are applicable to virtually any high-level language you wish to write in. (Each has a purpose.) Programming certain routines at the assembly language level may become necessary or desirable, even in COBOL. (Forgive me, Grace!) If it does, using tools such as librarians and symbolic debuggers will make the job easier to manage. I may pick up some C from Joe's article, though, as I will continue to read it looking for the better Clear Screen utility. Would it be possible to change the name of the column to "Language Notes (Emphasis on C)" so I don't feel guilty reading a column about a language I'm not interested in?

Mark Servello
Adjunct Professor (Computer Science)
National University
San Diego, CA

Another view of the PUP

I have just received issue #26 of *Sextant* and read the Programmer's Utility Pack (PUP) article by William M. Adney. I recently received a notice from ZDS to upgrade my Version 2 PUP to Version 3. I bought the PUP Version 3 package because I wanted the revised MS-DOS programming information and an upgraded version of BSE150, now called BSEPC. My comments on the package follow.

The ZDS documentation on MS-DOS Version 3.1 is up to their usual standards for clarity and completeness. The information provided on MS-DOS and the utilities is an upgraded version of the information that was provided in PUP Version 2. What is missing is the information on the ROM BIOS that was in the PUP Version 2. This information is now only available in the respective technical manuals for the various systems. ZDS does not tell you that you have to purchase an additional manual to have complete programming information. I have the Programmer's Reference Manual for the Z-100 PC Series. It presents the ROM BIOS information in what I consider a very incoherent manner. In the PUP Version 2, the programming information was presented very clearly. It was easy to find what you needed. In the Programmer's Reference Manual you have to plow through I/O port descriptions, switch position settings, etc. It is a treasure hunt to find the information, but it is there.

ZDS did a good job of copying the Microsoft MASM manual. However, I have tossed the second volume of the PUP Version 3, which consists of the Microsoft utilities, into my obsolete software storage area. Why is this? I already own Microsoft MASM Version 4.00. I bought it

H/Z89 and H8 High Performance Products

Discover why hundreds of H/Z89's still outperform PC clones!

Hard Disk Systems

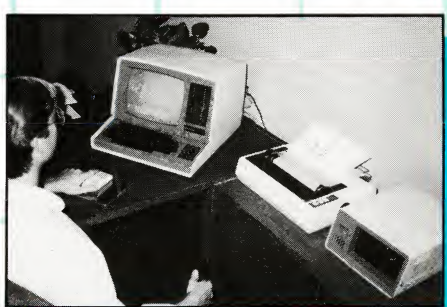
- Latest Technology 3.5 and 5.25 Inch Drives and Controller
- Includes Comprehensive Support Software for CP/M and HDOS
- Fully Compatible with H17, H37, H47, 4 MHz, CDR, Magnolia, etc.
- Includes 2 Centronics Parallel Printer Ports and Power Supply
- 6 Month Limited Warranty with 1 Year Warranty on Drive Unit
- Fast and Easy to Install for Either an H/Z89 or H8

Includes Z37 Compatible Floppy Disk Controller!

10 MB for Internal H/Z89 Mounting (65 ms)	$795
20 MB for Internal H/Z89 Mounting (65 ms)	$895
10 MB with External Cabinet (65 ms)	$895
20 MB with External Cabinet (65 ms)	$995
30 MB with External Cabinet (40 ms)	$1325
40 MB with External Cabinet (40 ms)	$1435
67 MB with External Cabinet (40 ms)	$2295
Optional 40 Track Floppy Drive (as Shown)	$125
Optional 80 Track Floppy Drive	$175
Users' Manual Only (Deductable)	$10

Computer Aided Drafting

- Turn Your H/Z89 or H8/H19 into a True CAD Graphics Workstation!
- High Resolution 640 by 768 Pixels with 640 by 250 Display Window
- Optical Mouse Control Drafts Complex Designs in Seconds!
- For all Types of Drafting, Electrical, Mechanical, Architectural, etc.
- Compares to Similar CAD Software Costing 10 Times as Much!
- Supports Hardcopy Output to Most Dot Matrix Printer Types
- Includes 256k RAM Drive and Print Spooler for CP/M and HDOS



Interactive Graphics Controller Hardware	$395
CAD—89 Software Package for CP/M or HDOS	$175
Optical Mouse Drafting Input Device (Shown)	$145
Users' Manual Only (Deductable)	$10

MasterCard VISA

Call NOW so we can rush our complete information package to you!

SigmaSoft AND SYSTEMS

"Support is the most important feature."

17000 Dallas Parkway, Suite #207, Dallas, TX 75248

(214) 380-6187

Please include $10 for UPS shipping and specify H/Z89 or H8 with your order. Texas residents please add 6% sales tax.

Circle #185 on Reader Service Card

Get a **FREE** directory of Heath/Zenith suppliers—a $12.50 value—just by circling 107 on the Reader Service Card.

See page 12 for details.

If you supply products or services to Heath/Zenith users and have not yet sent in a form for your free listing in *The Buss Directory*, call Dana Lombardy at 202/544-2868.

because ZDS was too slow in providing an upgrade for MASM Version 1.27, which was provided in the PUP Version 2. What do you get with the Microsoft utilities provided with PUP Version 3? You get utilities that have been out of date since January of 1986! A comparison of the utilities and version numbers follows.

Utility	ZDS	Microsoft
MASM	3.00	4.00
LINK	3.00	3.05
SYMDEB	3.00	4.00
MAPSYM	3.00	4.00
CREF	3.00	4.00
LIB	3.00	3.02
MAKE	?	4.00
EXEPACK	N/A	4.00
EXEMOD	N/A	4.00

All of the versions supplied by ZDS are at least one version out of date. Note that ZDS doesn't even provide the EXEPACK and EXEMOD utilities that Microsoft provides. This points up the problem of not buying software from the original vendor. I have been offered several upgrades by Microsoft for my MASM package since I originally purchased it. I was not offered any upgrades by ZDS. Only by buying the PUP Version 3 package did I get an upgraded version of MASM. This is a sore point between me and ZDS. I just received an offer [from ZDS] to upgrade my Microsoft Word Version 1.10 to Version 3.00. I already have Version 3.10 through an upgrade directly from Microsoft, and have had so since early November. And, of course, Multiplan version 2.00 has been out for about a year, yet ZDS hasn't yet considered an upgrade to Multiplan Version 1.20.

This is not meant to be a total criticism of ZDS. They produce fine products and documentation for the products. Better than anyone else in the industry. These comments are meant as a positive effort to help ZDS improve their already fine products and services.

Mike Silverstone
Irvine, CA

For a look at the specific utilities of the PUP Version 3, see William Adney's article, "The PUP Utilities: Zenith's Useful Tools for the '100, '150, and '200," on page 32 of this issue.

SigmaSoft left out

Over the months, I have looked forward to receiving your magazine and, in particular, Walter Janowski's column. This month I felt compelled to write a letter to Walt, and as I have thought about it, I decided to let you know my feelings also.

I have found your publication to be above reproach in your consistently fair and equitable treatment of all members of the eight-bit community until this issue.

I own a rather ancient H8/19/17, and was ready to retire it to the garage when I saw a full-page ad in a friend's copy of your magazine. It was to be the turning point for me!

I had talked to or attempted to talk to some of the suppliers Walt mentioned in his column "The Eight-Bit World" (November-December 1986) and had become frustrated. I had had so much trouble getting the phones answered that I was momentarily speechless when I heard "Good afternoon, SigmaSoft" on the second ring when I called SigmaSoft and Systems in Dallas.

If you can get Walter to share my letter, you will find that I would give SigmaSoft and Systems a "four-star" rating if they were in the restaurant business and doing as well as they are in the eight-bit hardware and software business.

I have found their products and services to be exactly as advertised in your magazine.

Immediate off-the-shelf delivery; no pay-me-now-and-wait.

I had what I thought to be a problem with their hardware that turned out to be a problem in my basic system. I can personally attest to their commitment: "Support is the most important feature." System support, superior graphics, Pseudo Disk Drive (to 256K), Print Spooler, two Centronics Parallel Printer Ports, two Trackball/Joystick Ports—I couldn't believe the price for it all. The Print Spooler is a joy to use! No more waiting on the printer.

I know this is not a technical letter; therefore, it will probably not get into your "Letters" column, but I just had to

ZRAM-205: RAM Multiplier

The ZRAM-205 package is used to modify a Z-205 memory card so that thirty-six 256K RAM chips (not included) can be installed in place of the existing 64K RAM chips giving 1024K of bank-switched memory in the form of four banks of 256K each. Bank 0 (256K) is selected automatically on power-up and must be used as part of system memory. Included MS-DOS software (with source code) makes the remaining three banks into a 768K RAM disk. The modified Z-205 still uses only one S-100 bus slot and will operate at 8MHz if 150 nanosecond RAM chips are used.

The ZRAM-205 package includes a small piggy-back circuit board, a packet of wire and sleeving, a diskette, and a user's guide. Installation takes about 2 hours and requires some soldering to connect the RAM chip socket pin-1's together and to the small circuit board. Our ZP173 PAL is required if used with new motherboard 768K Z-100™.

$49 Each (+ $8 for ZP173 PAL)

ZMF100a: 768K On Old Motherboard

The ZMF100a™ modification package lets you plug industry standard 256K RAM chips into your "old" motherboard Z-100™ computer. Up to 768K (27 RAM chips) without using an S-100 bus card slot! Maintains fully compatible memory maps so that all software will run. Usable only on part number 85-2653-1 motherboard (assembly part number 181-4917 or less)!

Installation of the ZMF100a™ package is a simple, plug-in job requiring ***no soldering*** or trace cutting and only partial disassembly of the computer. The memory chip pin-ones are connected together by a plug-in bus bar. There are no permanent changes to the motherboard.

The ZMF100a™ is a professional quality circuit board supplied with complete instructions and all required materials, except memory chips. It is compatible with the popular PC emulators and with 8MHZ speed modules.

$65 Each

FBE SmartWatch: Calendar/Clock

The Dallas Semiconductor DS1216E SmartWatch is a chip-sized module that plugs-in under the computer's monitor ROM. It contains a full-functioned calendar/clock and works in the Z-100 series (spacer kit required), Z-138/148, Z-150/160 series, and Z-158 computers. Easy installation. Our package includes the SmartWatch, MS-DOS date/time setting software on diskette (with source code) and documentation.

$44.95 Each (+ $2.00 for Z-100 Spacer Kit)

FBE

FBE Research Company, Inc.
P. O. Box 68234, Seattle, WA 98168
(206) 246-9815

Order Direct from FBE or
See Your Heath/Zenith Dealer.
UPS/APO/FPO Shipping Included.
VISA or MasterCard Accepted.

Trademarks: ZMF100a/FBE Research Co. Inc., Z-100/Zenith Data Systems, MS/Microsoft Corp., Gemini/Gemini Technology Inc., EasyPC/UCI Corp., PAL/Monolithic Memories Inc.

Circle #142 on Reader Service Card

tell someone that this company is the finest I have found for eight-bit hardware and software and service after the sale. I believe you owe it to your readers to correct this apparent oversight.

Don Skinner
Alta Loma, CA

As stated in Mr. Janowski's column, only those vendors who had contacted him were mentioned in "The Eight-Bit World" in the November-December 1986 issue. We're glad to hear of your experience with SigmaSoft and Systems (17000 Dallas Parkway, Suite 207, Dallas, TX 75248, 214/380-6187).

Some information and advice for eight-bit users

I would like to pass some important information along to your eight-bit-oriented subscribers. This concerns a pair of newsletters specifically slanted toward the H8 and H/Z88/89/90. Their vital statistics are as follows:

SEBHC Journal
c/o Lenny Geisler, Editor
895 Starwick Drive
Ann Arbor, MI 48105
Rate of appearance: monthly
Annual subscription: $12.50
Size of December issue: 18 pages
Estimated subscription base: 50+

The Staunch 8/89'er
c/o Hank Lotz, Editor
2024 Sampson Street
Pittsburgh, PA 15221
Rate of appearance: quarterly
Annual subscription: $5
Size of December issue: 8 pages
Estimated subscription base: 90+

If you anticipate hanging on to your eight-bit Heath/Zenith machine for some time, as I do, I strongly urge you to subscribe to one or both. Unfortunately, with the increasing dominance of the IBM compatible even in our hardware-specific magazines, the currently available information resources about our equipment are fast dwindling.

However, it is also my contention that more articles would appear here and in *REMark* if more users would write about their machines. The magazines and newsletters can't publish anything about the '8 and '89 if no one submits anything! So support for Heath/Zenith's eight-bit equipment, as with any other discontinued model, comes down to the willingness of the owner (you and me) to contribute to the national publications. I'm doing my part; how about you?

Go to it by writing and subscribing! The cash you make is your own to spend.

Kirk L. Thompson
West Branch, IA

Please send letters to: Editor, Sextant Magazine, 716 E Street S.E., Washington, DC 20003. Letters will be edited according to style and space requirements. Due to the volume of mail received, we are unable to print or respond to every letter we receive.

ARE YOUR PERSONAL COMPUTERS ON SPEAKING TERMS?

Connect them with a Novell Local Area Network.

Novell sets the standard for high performance LANs with four complete LAN systems. Each one offers the reliability, security, and DOS compatibility of Novell's NetWare™ operating system.

Zeducorp offers the full Novell product line. Let us network your Zenith (or compatible) personal computers with the Novell Solution!

NOVELL

ZEDUCORP *P.O. BOX 68 STIRLING, NEW JERSEY 07980* ***(201) 755-2262***

Your Authorized Novell Dealer.

NetWare is a trademark of Novell, Inc.

Circle #236 on Reader Service Card

VAX/PC Users

ZSTEMpc™-VT220 Emulator for the PC Series
High performance COLOR VT220. Double high/wide, 132 mode, smooth scrolling, downloadable fonts, user defined keys, 8-bit and full national/multinational modes, XMODEM and KERMIT, softkey/MACROS, DOS access **$150.00**
Available soon: VT220 Style replacement keyboard.

ZSTEMpc™-VT100 Emulator for the PC Series
High Performance COLOR VT100 **$99.00**

ZSTEMpc™-4014 Emulator for the PC Series
Use with ZSTEMpc-VT100, VT220, or stand alone. Interactive zoom and plan. Save/recall images to/from disk. Keypad, mouse, printer, and plotter support.

ZSTEM™-VT100 Emulator for Z-100s $148.95

DECkHAND™ Utilities for the Z-100 & PC Series
MS-DOS Utilities with VAX/PDP-11 switch processing, DIR, COPY, DELETE, RENAME, TYPE with wildcards, full DATE processing, attribute processing, query, backup and more. **$ 49.00**

Z-100 PC Memory Expansion with ZPAL™

Z-151/Z-161 Users
Use 256K bit memory chips on the original memory board. Extend the memory to 640K or 704K bytes with ZPAL-2 Decoder **$ 29.00**

Z-158 Users
Extend your system to 768K bytes with 3 banks of 256K bit memory chips and ZPAL-158 decoder.
704K contiguous + 64K separate
or
640K contiguous + 128K separate
ZPAL-158 Decoder **$ 36.00**

Z-138/Z-148 Users
Extend your system to 768K bytes with 3 banks of 256K bit memory chips and ZPAL-148 decoder.
704K contiguous + 64K separate
or
640K contiguous + 128K separate
ZPAL-148 Decoder **$ 36.00**

ZSTEMpc-VT100 Choice of the U.S. Airforce
5,000-10,000 ZSTEMpc-VT100 Packages AFCAC 254

Call today: VISA and MasterCard accepted
Quantity and dealer discounts available
30 day money back guarantee
AIR MAIL POSTAGE included for US & Canada
KEA Systems Ltd.
2150 West Broadway, Suite 412
Vancouver, B. C. CANADA V6K 4L9
Technical Support (604) 732-7411
TELEX 04-352848 VCR
Order desk (800) 663-8702 Toll Free

Zstem™ by KEA SYSTEMS

Trademarks IBM PC,jr,XT,AT - IBM Corporation. VT100, VT220, DEC, VAX - Digital Equipment Corp. ZSTEMpc - KEA Systems Ltd.

Circle #175 on Reader Service Card

Wildfire Speeds Up the '150 or '160 to Match the '158

A '151 user measured a speed increase ranging from 10% to 100%. The amount of improvement depends on the program being run.

Charles Floto

For over two months, we've been enjoying about a 70% increase in the speed of operation of the Z151 we use to prepare *Sextant* articles for typesetting. The improvement has been as great as 100% for memory-based operations such as a global search-and-replace. Even the disk-based activity of copying multiple files to a subdirectory of the hard disk has been 10% faster.

The speed increase came unaccompanied by any unpleasant surprises. I've even gotten used to having a bucking horse and red light on the front of the Z151.

I *do* still notice the startling immediacy with which new screen displays pop into view. This has been the most obvious result of installing Wildfire from Software Wizardry. It's also the hardest to quantify as a speed comparison. I suspect some threshold of perceptivity has been crossed, so that a moderate increase in the speed of painting the screen creates a qualitatively different experience. (Ten slightly different pictures per second remains just that. But see 16 per second, and you're watching a movie.)

Photo by Charles Floto

Wildfire's control panel includes three switches and an indicator light.

Speed tests

Software Wizardry claims that Wildfire doubles the speed of computer operations that can be accomplished entirely in memory. My tests confirmed this for at least one task. That involved removing all the hyphens from a file of hyphenated words. I also found roughly a doubling of speed in recalculating a 1-2-3 spreadsheet, and in running a BASIC program with an empty FOR . . . NEXT loop.

There are two catches in this area: one, practical; the other, experimental. Both spring from the fact that my usual computer work doesn't involve much time consumed by purely in-memory processing. These operations didn't *ever* take very long. The practical consequence is that Wildfire saves me only a few seconds every time I recalculate a spreadsheet. The experimental catch is that an error of even one second in my timing could make a big difference in the apparent percentage of improvement.

Having established the maximum speed increase as 100%, I looked for the minimum speed improvement Wildfire would provide. One time-consuming task I perform periodically is to save copies of *Sextant* articles in production onto two floppy disks. I start by segregating them into a subdirectory of the hard disk. I figured Wildfire wouldn't help much in this disk-intensive copying task. In fact, it produced a 10% improvement. Not very dramatic, but that represented a saving of over half a minute. Copying 175 files to a subdirectory took 381 seconds without Wildfire, and only 345 seconds after Wildfire had been installed.

Dual speeds

I had another ploy to find Wildfire's minimum performance improvement. I invoked its lower speed. The slower speed setting resulted in a time of 370 seconds to copy the same 175 files—about 3% faster than pre-Wildfire.

Why bother with a slower speed at all? For one thing, you have to down-shift to FORMAT a floppy disk or use the DISKCOPY command. Naturally, I forgot the manual's warning on this point. The Z151 reminded me by displaying an error message. The computer system knew immediately there was *something* wrong. It was up to me to take the hint and remember that I should slow things down.

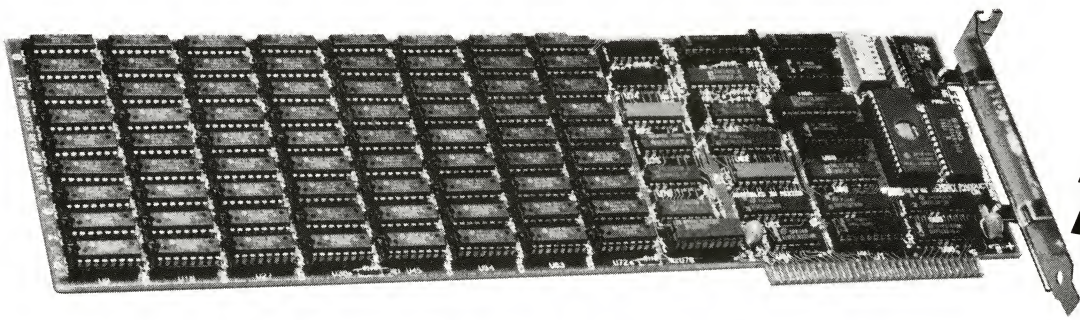
Another reason to run at Wildfire's slower speed would be to hold your own against a game. But I suspect the option is provided primarily as good design practice.

Heath/Zenith built a speed switch into the Z158. Wildfire was developed at least in part as a substitute for throwing away a Z151 or Z152 and getting a Z158. Software Wizardry says Wildfire makes the '151 faster than an 8-megahertz '158. Since the '158's clock runs only 68% faster than the '150's, I'm inclined to

Expand your ZENITH PC Memory with

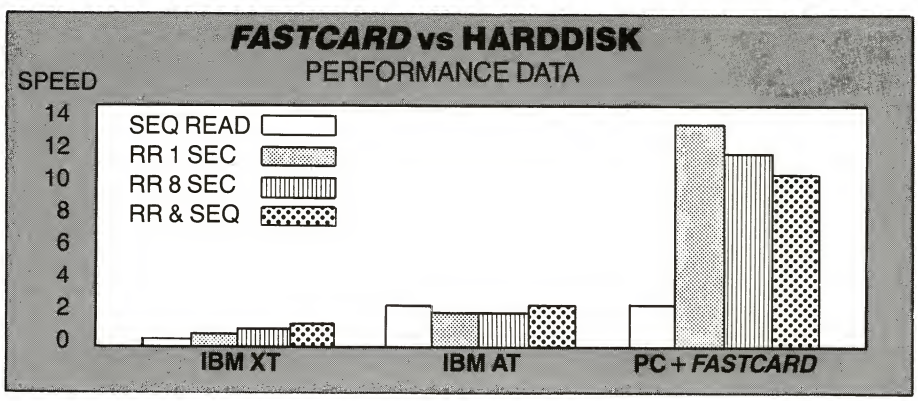
FASTCARD®

fully loaded with 2 *MBYTES* for just $295*



10 DAY FREE TRIAL!

FASTCARD speeds disk I/O by as much as tenfold, *as shown in the following chart.*



This graph shows benchmark test results of a PC equipped with *FASTCARD* versus a PC-XT and PC-AT. These tests were run by a major independent testing laboratory using their standard disk performance benchmark tests.

Specifically designed for compatibility with the 8 MHz Zenith bus, *FASTCARD* provides both extended and expanded memory plus the following standard features:

- Portable between all Zenith models
- Lotus/Intel/Microsoft compatible
- Up to 2MB with Split Memory Mapping to
  - – Fill memory to 640K
  - – Provide Expanded memory over 640K
- Unique Disk Caching
- Ram Disks (up to 8MB)
- Custom Password Security
- Print Buffering
- Built-in Diagnostics and Automatic Fault Tolerance
- Factory Installed and Tested DRAM s

*Each *FASTCARD III* comes with 2 MBytes of memory for $295. *FASTCARD IV*, available with 2 MBytes, includes serial/parallel ports, game port and a clock calendar for $295.

For additional information, call: PMi PERIPHERAL MARKETING, INC. **(602) 483-7983**
7825 E. EVANS RD., #600, SCOTTSDALE, AZ 85260

Circle #248 on Reader Service Card

MAKE YOUR PC SEEM LIKE AN AT!

MAKE YOUR AT SEEM LIKE A DREAM MACHINE!

FANSI-CONSOLE tm

The Integrated Console Utility™

FAST, POWERFUL ANSI.SYS REPLACEMENT

For the IBM-PC, AT, and clones

New Version 2.00 is MUCH FASTER!
Now blink free scrolling on CGA!

Now uses EMS/EEMS for Scroll Recall
New Menu Program for Changing Options

GET A BOX FULL OF UTILITIES!
MAKE LIFE EASIER FOR ONLY $75!

- Speed up your screenwriting 2-6x
- Extend your ANSI.SYS to full VT100
- Add many more escape sequences
- Scroll lines back onto screen
- Save scrolled lines into a file
- Add zip to your cursor keys
- Free your eyes from scroll blinking
- Easy installation
- Get a 43 line screen w/EGA
- Get a 50 line screen w/CGA
- No more annoying typeahead beep
- Prevent screen phospher burnin
- Control many programs' use of color
- Generate breakpts from keyboard
- Shorten that annoying bell
- Over 50 other useful options

"The psychological difference is astonishing"
—*Lotus* June 85 pg 8.

"So many handy functions rolled into one unobtrusive package"
—*PC-World* Feb 86 pg 282.

"The support provided by the publishers is extraordinary"
—*Capital PC Monitor* May 86 pg 25.

". . . the best choice for improving your console . . ."
—*Capital PC Monitor* June 86 pg 26.

460p Manual (w/slip case) & disks $75.

Satisfaction Guaranteed!
Order Yours Today!

HERSEY MICRO CONSULTING
Box 8276, Ann Arbor, MI 48107
(313) 994-3259 VISA/MC/Amex

DEALER INQUIRIES INVITED

Fast ANSI Console Driver

Fast ANSI Console Driver

Circle #168 on Reader Service Card

believe that.

Even Wildfire's slower speed made as much as a 27% improvement in my tests.

The switch panel

While the Z158 does have a speed switch, it's hidden away on the rear panel—sticking out from the back of the CPU board. And you have to remember which position invokes which speed.

The switches controlling Wildfire's speed are clearly labelled HIGH and LOW. Each switch is about ½" square, with HIGH placed ½" *above* LOW. As a further distinction, the HIGH switch is red. A red LED just to its left lights up during the higher speed mode.

About 4" to the left of the speed controls is the SYSTEM RESET switch—further labelled CAUTION for the benefit of those in the IBM-compatible world who may not have been exposed to an emergency brake before.

Software Wizardry recommends using the SYSTEM RESET switch rather than the Ctrl-Alt-Del keyboard combination if you wish to reboot the system. Forget, and you'll be reminded with the message:
ERROR: Timer Interrupt failure!
When this happens, simply push the SYSTEM RESET switch. (The Wildfire manual says you could, alternatively, type the ESC key. This did clear the error message for me, but left our system unable to use the hard disk until SYSTEM RESET was pushed.)

Wildfire starts at LOW speed at power-on or after the SYSTEM RESET switch has been pressed. After the Z150 firmware has had a chance to perform internal

```
1000 REM LOOP1
2000 FOR X = 1 TO 10000
3000 NEXT X


1000 REM LOOP2
2000 FOR X = 1 TO 10000
3000 PRINT X;
4000 NEXT X


1000 REM LOOP3
2000 FOR X = 1 TO 10000
3000 N = X^2
4000 NEXT X
```

Three FOR. . . NEXT loops were among the programs used to test Wildfire. LOOP1 was empty; LOOP2 wrote to the screen; and LOOP3 involved a bit of math. (See below for the results.)

Wildfire Benchmarks

	Time in Seconds			Percent Improvement	
	Before	Slow	Fast	Slow	Fast
Delete optional hyphens	14	11	7	27	100
Sort #2 under 1-2-3	27	22	15	23	80
Sort #1 under 1-2-3	25	20	14	25	79
BASIC LOOP3	55	48	32	15	72
BASIC LOOP1	12	11	7	9	71
BASIC LOOP2	193	171	115	13	68
Recalculate spreadsheet	10	9	6	11	67
Global change	90	81	60	11	50
Index Friday file	18	20	16	-10	13
Hyphenate & justify	161	144	144	12	12
Copy to subdirectory	381	370	345	3	10

All tests not involving disk access ran at least 50% faster at HIGH speed.

power-up housekeeping at its accustomed speed, Wildfire switches into HIGH and the red LED comes on.

The switch panel is 5″ wide, 2″ high, and about 1/16″ thick. It's backed by peel-and-stick adhesive.

Installation

Installing Wildfire took me about 1½ hours, including reading the manual and some brief interruptions to answer the phone. (I've seen reports on CompuServe's HUG bulletin board from people who say they did it in half an hour. It would take me half that time just to remove and replace all the screws and cables.) First I had to clear some working space and find the screwdriver. Fortunately, the '150 uses the same size screws as a 1970 VW.

With the cover of the '150 off, I removed the CPU board. Ten of its integrated circuit chips had to be removed. Nine of these were replaced by chips from the Wildfire package. That meant I had to ensure that eighteen rows of pins were perpendicular to their respective IC packages. (Typically, ICs are shipped with the points of their pins spread wider than the spacing of the socket holes.) The drill is familiar to kit builders. Place the IC on its side on a piece of metal and roll it slightly toward the pins until the package is exactly vertical, rather than almost so. Then turn it over and do the same on the other side.

The tenth IC from the CPU board gave up its socket to serve as a mount for Wildfire's circuit board. Then I had to figure out the best way to route the connection from this board to the switch panel. Software Wizardry calls it a cable—and it *is* a flexible means of establishing multiple connections between its two ends. It looks like a ½″-wide strip of clear plastic with five stripes of metallic paint.

I attached the Wildfire switch panel near the bottom left of the Z150 front panel. The picture in the manual shows it higher and toward the right, which would be easier to reach. But I seldom change speeds or use the SYSTEM RESET.

(Initially, Software Wizardry left it up to '160 users to cope with the transportable's special constraints on cable routing and switch-panel mounting. If you have a '160, you may wish to call Software Wizardry for hints gathered from experience in the field.)

How much for how fast?

There are less expensive ways to speed up a Z150, some of which may be more appropriate for the hobbyist than Wildfire. Our '150 is used to bring you *Sextant*, so I didn't want to take any chances. I waited until I'd heard of multiple successful installations of what I felt was a conservative (i.e., paranoid) design. Even then, I waited until one issue had gone to press and the next one wasn't on the '150 yet.

Wildfire is a $249 alternative to buying a Z158. It makes a noticeable difference, but perhaps not a radical one. I found about a 70% speed improvement in a mixture of the applications we're running on our '150.

There are two obvious factors that make Wildfire more expensive than some other methods of speeding up a Z150 or Z160. One is the fancy switch panel that tells you which mode Wildfire is in. The other is the greater number of components used in the Wildfire design. The manual points out that Wildfire's higher speed mode increases the clock speed only to the CPU—the speed of the clock signal on the bus remains as ZDS designed it.

Wildfire is a $249 alternative to buying a Z158.

Software Wizardry doesn't indicate how fast Wildfire runs the CPU. They do point out that there are at least two other elements of their speed-up strategy. One of these elements involves replacing the Z150's Intel-designed 8088 CPU with a NEC-designed V20 chip. One cloud over Wildfire's future might be Intel's copyright suit against NEC over the V20. But Software Wizardry has suggested they're prepared to alter Wildfire's design as circumstances warrant.

Unfortunately, discussion of speed-increase hardware on an IBM-compatible computer too often includes the question of how it rates as measured by the System Index included in the Norton Utilities. Reports on the HUG bulletin board rate Wildfire at a System Index around 2.7 or 2.8—compared to an IBM Personal Computer's SI of 1 at 4.77 MHz. I mention that only in case you want to compare it to SI ratings claimed for other products. I did see a suggestion that for a more realistic measure of relative speed you should take the square root of the System Index attributed to any product. From my experience, that *would* be a more realistic figure. (Taking the square root of 2.7 or 2.8 would suggest a speed increase in the range of 1.64 to 1.68 times the Z150's unmodified speed; that's about what I measured.)

Ordering Information

Wildfire, $249.
Software Wizardry
1106 First Capitol Drive
St. Charles, MO 63301
314/724-1738 △

Bus Specific Networks
NEW LINK 'AGE'
Announcing "Z-100 under NOVELL" with ICM's new Node-Z100/N package linking PCs to Zenith systems.
InterContinental Microsystems introduces new connectivity for Zenith's Z-100 products, to run NOVELL Netware, NOVELL utilities and link IBM PCs and PC-compatibles. ICM's LANS-100 ARCnet controller plugs into the Zenith 100 series workstations to give you compatibility never before possible.
ICM's new Node-Z100/N package includes all the shell driver software you need. And when you link our package with your Z-100s, you can network with PCs, ATs, XTs and compatibles running under NOVELL. It can also be used with ICM PC-bus products including the CPS-PC workstation processor and LAN-CPS (PC-bus) ARCnet controller. How's that for new linkage?
Call ICM for complete details and reseller pricing.
PC, ARCNET, AND S-100 APPLICATIONS
ICM
TOMORROW'S BREAKTHROUGHS TODAY
InterContinental Microsystems
4015 Leaverton Court, Anaheim, CA 92807
Phone: (714) 630-0964
Telex: 821375 SUPPORT UD
Easylink: 62562040 BBS (714) 632-8750
ARCnet is a registered trademark of Standard Microsystems Corp. Netware is a registered trademark of NOVELL, Inc.
IBM PC-AT, IBM PC-XT, IBM PC and PC-DOS are registered trademarks of International Business Machines Corp.
Circle #106 on Reader Service Card

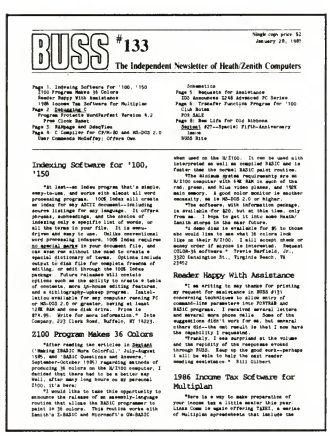
Get a FREE Directory of Heath/Zenith Suppliers

You can get a FREE directory of Heath/Zenith suppliers—a $12.50 value—just by circling 107 on the Reader Service Card!

Since April 1977, *Buss* newsletter has given Heath/Zenith users reliable news and inside information about their computer systems. Now, to celebrate *Buss*'s 10th anniversary, you can start a no-risk, 10-issue trial subscription to *Buss*—including a FREE copy of the 1987 edition of *The Buss Directory*!

Here's how this special offer works:
1) Circle 107 on the Reader Service Card and we'll start your 10-issue trial subscription. You'll receive your first issue within two or three weeks.
2) You'll receive a few issues of *Buss* and your copy of the 1987 *Buss Directory* (to be published in May). We'll also send you an invoice for $10—that's a savings of 44% off the regular subscription rate! (Overseas, $16.)
3) To keep getting *Buss*, just send us your payment. Or, if you decide *Buss* isn't for you, just write "cancel" on the invoice and return it to us—you won't owe a penny. *The Buss Directory* (a $12.50 value) and the issues of *Buss* you'll have received are yours to keep.

You can't lose!


BUSS #133
The Independent Newsletter of Heath/Zenith Computers

Indexing Software for '100, '150

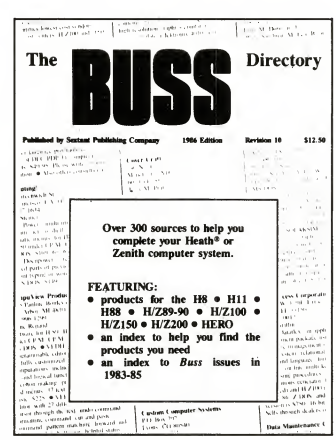
2100 Program Makes 36 Colors

1986 Income Tax Software for Multiplan

Reader Happy With Assistance

Here's what you'll find in *Buss*:
- New product sources and upgrades for all machines, from the '8 to the '248
- Users' advice and discoveries about their systems
- FREE "For Sale" ads so you can buy or sell equipment
- "Requests for Assistance"—get help for your system through the network of 6,000 *Buss* subscribers
- News and events in the Heath/Zenith community
- Unbiased coverage of Heath/Zenith systems

You'll also get *The Buss Directory* as your FREE bonus!
The Buss Directory is an annual guide to over 300 Heath/Zenith vendors of hardware and software products, as well as a consolidated index to five years of articles in *REMark*, *Sextant*, and *Buss*.
You'll have up-to-date information at your fingertips about resources available for your system. It's an indispensable reference manual.
The 1987 *Buss Directory* will be published in May, and you'll get it FREE as part of your trial subscription with this no-risk offer!


The BUSS Directory
Published by Sentant Publishing Company
1986 Edition
Revision 10
$12.50
Over 300 sources to help you complete your Heath® or Zenith computer system.
FEATURING:
• products for the H8 • H11 • H88 • H/Z89-90 • H/Z100 • H/Z150 • H/Z200 • HERO
• an index to help you find the products you need
• an index to *Buss* issues in 1983-85

Buss, 716 E Street S.E., Washington, DC 20003 ● 202/544-3081

Circle 107 on the Reader Service Card to start your no-risk trial subscription—and get a FREE copy of The Buss Directory. Send the card in today!

WRHUGCON 3: HUGgies in Disneyland

The third Western Regional Heath/Zenith Users' Group Conference combined some new technology with some old questions. There was also a chance to pick up some inexpensive software.

Kieran P. O'Leary

If you've never been to Los Angeles (as I hadn't before the weekend of November 14-16, 1986), you may have heard that it's warm; that the people are laid back; that it's the place where dreams come true. This is not pure hearsay; it appears to be just that way. But when you're from New York City, the winters are real; the people are edgy with a vengeance; and the only realizable dream is catching a train that gets you to work on time. Los Angeles seems like one big fantasyland.

If all of the above is true about L.A., then Disneyland epitomizes the L.A. experience. Palm trees abound; flashing lights and pastel colors illuminate the Anaheim landscape—every inch is decorated as only Walt Disney could have imagined it. The only difference is that Disney planned his grounds; Los Angeles didn't plan theirs.

Inside the Disneyland Hotel convention center, removed from the glitz, the third annual Western Regional Heath/Zenith Users' Group Conference (WRHUGCON 3) went on. No fancy props (except blinking color monitors), no costumed characters (just pixel-based ones on computer screens), no flashing lights (not even from a Heath robot)—none of these appeared at WRHUGCON 3. However, 700 users, 13 vendors, the various HUG support groups (*REMark*, national HUG, and the Pomona and Anaheim HUGs), and the Heathkit store did appear. Their presence showed that there's nothing like a Heathkit computer to bring people together.

Having sampled each of the three regional HUGCONs held this year, I'd say that the Western Regional conference best illustrated the sense of community among HUGgies. One thing that has convinced me of HUGgies' commitment is their willingness to travel long distances for a show—from such faraway places as Guam. It's also comforting to see the chiefs from Veritechnology and Heath—Joe Schulte and Bill Johnson—show up at these conferences, meeting the people they represent.

Photo by Charles Floto

Heath/Zenith Computers & Electronics offered many bargains.

The show, despite a shortage of publicity, was a success. The banquet Saturday night was highlighted by the awarding of two ZP-150 laptop computers, one H241, and a HERO Jr. robot. Attendees were entertained by Herb Friedman, president of Western Regional HUG, and Bill Johnson. The awards were prefaced by a version of "Name That Pioneer," in which Herb showed slides of computer forefathers such as Adam Osborne, Peter Norton, Bill Gates, and George Morrow. Herb humorously commented that each of these "big names" had turned down an invitation to speak at WRHUGCON.

Although there were many gems to be discovered throughout the weekend, three in particular pointed up the Heath/Zenith community's efforts to keep up with its past, present and future: HDOS 3, the *Kit Builder's Journal*, and the SCSI bus.

HDOS 3 and other eight-bit support

Although the hubbub about the release of version 3 of the Heath Disk Operating System began at national HUGCON in August, HDOS 3 was not officially available then. Jim Buszkiewicz and Bob Ellerton of national HUG confirmed at WRHUGCON that, as of the first week of December, HDOS 3 was on the HUG office's bulletin board and could be downloaded. At 1200 baud, the estimated connect time would be three hours.

But in case you didn't notice it in Walt Janowski's "Eight-Bit World" in *Sextant* #26, you have an alternative. Bill Parrott, HDOS 3's developer, will supply the operating system—all seven 5¼" disks (for H17 and H37 versions; the H47 version

Kieran P. O'Leary is assistant editor of Buss *newletter, and is also a* Sextant *employee. In his spare time, he studies foreign languages, and hopes one day to learn a computer language or two.*

comes on three 8" disks)—for just $25. Users who live far from Michigan should find that a blessing.

On the eight-bit front also were several vendors who continue to support the older machines. Dell Auer of T.D. Engineering, for example, offers HERBy, the H89 Extended RAM Board, which provides one megabyte of dynamic random-access memory (DRAM), for $140. At the same time, T.D. is developing its line of expanded buses (paths over which information is transferred inside a computer) to accommodate 16- and 32-bit central processing units within the chassis of the '150 series. These will allow upgrades to IBM PC AT and XT compatibility.

Other companies such as Controlled Data Recording Systems (C.D.R.), while keeping abreast of emerging technologies, also continue to support the H89. One of C.D.R.'s standard products is their Super RAM 89 package, allowing the '89 greater speed and memory. Their RAM 89 Board 2 adds still more RAM; it can support a real-time clock and an SCSI (Small Computer Systems Interface) hard-disk interface. This type of support demonstrates, at least to me, that as long as there are enough interested users, someone will always offer enhancements for the older machines.

Pat Diehl of Kres Engineering showed me their portable conversion kit for the '89 and '100 series. The light metal cases are designed to be attractive as well as functional. Owners of older machines can now enjoy the advantage of portability—something a '171 user takes for granted.

Analytical Products' Peter Shkabara has a program called EMULATE that allows the '89 to read/write other disk formats—such as Kaypro II, Osborne 1, Morrow MD, to name a few. It shows that, along with their ability to expand machines and improve speed, vendors always have to be aware of the competition to keep everyone happy.

Certainly Al Davis, who drove all the way from Michigan, pleases many HUGgies: he displayed what appeared to be tons of boards of all kinds: keyboards, circuit boards, main boards—you name it. It must have reminded hackers of the Trenton Computer Festival and other hobby shows, where they can pick up spare parts for a song.

Kit Builder's Journal

Undoubtedly, hobbyists will be eagerly awaiting the premiere issue of *Kit Builder's Journal*, Heath's new publication, which may be in some users' hands by now. Pessimists sounding the death knell for the days of kit building will be surprised to discover that the hobby is very much alive.

The heading over the magazine's name states that the journal is geared toward the electronic kit hobbyist; however, Rick Simpson, the journal's editor, says that it covers "all aspects of building electronic and non-electronic kits—both Heath Company's and other kits available to the consumer." This news is refreshing in an age when convenience and "having things by yesterday" are often valued above all else. In any event, the fact that *Kit Builder's Journal* will be coming out bimonthly can only help strengthen the community of hardware hackers, and perhaps introduce some neophytes to the fine art of kit building.

The hackers appeared in numbers at Saturday's banquet. Herb Friedman, president of Pomona HUG, spoke briefly about the Heath Company's rationale for adopting new technologies: It had to keep up with the changing market or it would founder. The H8 was a fair flower in the blossoming microcomputer industry, but Heath soon had to keep abreast of the competition by adding support for the CP/M operating system. Later, the dual-processor '100 was introduced, with both the 8085 and 8088 CPUs. But the proliferation of IBM Personal Computers pushed Heath toward conformity. The new 80386 CPU technology illustrates Heath's attempts to be one step ahead of the competition.

Some kit builders, however, seem reluctant to accept Heath/Zenith's readiness and willingness to thrust itself into the market, and appear to dislike what they see. Depending on how useful hardware hackers find it, *Kit Builder's Journal*

Put an IBM-PC In your H/Z-100
WITHOUT SPENDING the COST of
A CLONE. NO Roms to get stale.
Handle ALL files BOTH MODES.
Latest HUG ZPC Disks/Data, and
Scottie Systems 'Scottie Board'

BOTH FOR ONLY $149

With OPTIONS AVAILABLE for
COM1 $44, COM2 $39, CLOCK $44.

Many Universities, Colleges, The U.S. Naval Academy, and MANY others use this EXCELLENT COMBINATION.

We make H/Z-100 Mod EASY
EASY NO SOLDER PREWIRED MOD KIT ONLY $5
(Does NOT REQUIRE M. BD. REMOVAL).

FREE WITH ORDER, H/Z-100 MODIFICATION AID DRAWINGS. FREE PARTS KIT. YOU SOLDER. (REQUIRES M. BD. REMOVAL).

Just ask a Scottie Board Owner. Write or Call for Free Information Packet. V & MC accepted.

Scottie Systems
2667 Cropley Ave. #123
San Jose, CA 95132

(408) 259-6226

IBM-PC is a registered trademark of IBM Corp.

Circle #111 on Reader Service Card

EVERYTHING YOU NEED... $279.00

Now it's easy to program the Heath-Zenith HERO-1® Robot with an Apple® II. HERO® Macros for the S-C Software 6800 Cross Assembler program in Heath's Robot Interpreter Language with easily remembered mnemonics.

For example, the line: 1130 > MVWRIM GRIP, OPEN, 60, FAST instructs the HERO® to open his gripper 60 units at fast speed. Motor position is expressed in base-10.

The HERO® Macros come with 30 pages of documentation.

Transfer to HERO® with ROBI... an affordable interface for the robotics experimenter... is simple.

- ROBI is a complete package. No additional hardware required for Apple® or HERO®.
- ROBI installs quickly in an Apple® II, II+, or IIe. Once installed, no hardware changes are needed. Within minutes, you will be programming HERO®.
- With ROBI and the Cross Assembler, the programmer uses Apple®'s memory to write the program, and HERO®'s memory to run the program.
- Not "copy protected," archival copies may be made as needed.
- ROBI offers expansion potential.

VISA and MasterCard accepted

BERSEARCH Information Services
26160 Edelweiss Circle
Evergreen, Colorado 80439

The Cross Assembler with HERO® Macros sells for $100.00; the ROBI Interface sells for $199.00. Both as a package — $279.00.

To order, or for more information, call (303) 670-6137.

APPLE® is a trademark of Apple Computer HERO® is a trademark of Heath Electronics

Circle #223 on Reader Service Card

I NEED *SEXTANT!*

Start my subscription right away!

Enter my subscription for:
- ☐ 12 issues for $29.91 ($34.50 to Canada)
- ☐ 6 issues for $14.97 ($17.25 to Canada; $21.00 overseas via surface mail; $35.00 via air mail)

Name _____

Address _____

_____

_____

Payment terms:
- ☐ Payment enclosed (checks must be in U.S. dollars payable on a U.S. bank)
- ☐ Bill me
- ☐ Charge my: ☐ Visa ☐ MasterCard

Card # _____

Expiration date _____

How did you obtain this copy of *Sextant*?
- ☐ Subscription
- ☐ ZDS Dealer
- ☐ Heath Store
- ☐ Retail Store
- ☐ Friend
- ☐ Other

We'll start your subscription with Issue #28 (May-June 1987), unless you request otherwise.

S27-S

Special Fifth Anniversary Offer

Extend my Sextant subscription at the lowest rate ever offered! Send me 26 more issues for just $55.55 ($65 to Canada; $80 overseas via surface mail, $130 via air mail).

Name _____

Address _____

_____

_____

- ☐ *My check is enclosed.*
- ☐ *Charge my:* ☐ *Visa* ☐ *MasterCard*

Card # _____

Expiration date _____

- ☐ *Bill me.*

S27-FAO

When mailing in an envelope,
please use ZIP code 20003.

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 13098 WASHINGTON, D.C.

POSTAGE WILL BE PAID BY ADDRESSEE

BUSS/SEXTANT
716 E Street, S.E.
Washington, DC 20077-0860

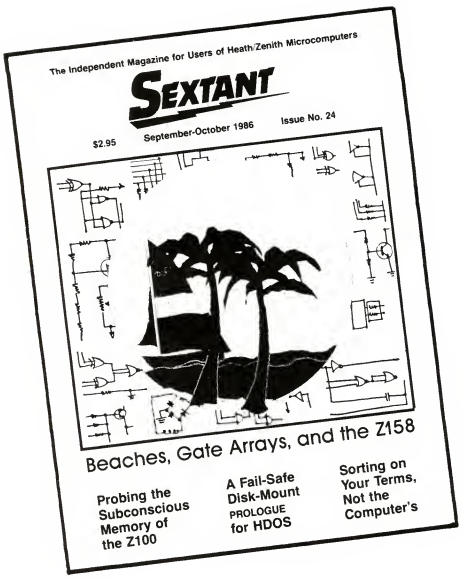
When mailing in an envelope,
please use ZIP code 20003.

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 13098 WASHINGTON, D.C.

POSTAGE WILL BE PAID BY ADDRESSEE

BUSS/SEXTANT
716 E Street, S.E.
Washington, DC 20077-0860


The Independent Magazine for Users of Heath/Zenith Microcomputers
SEXTANT
$2.95
September-October 1986
Issue No. 24
Beaches, Gate Arrays, and the Z158
Probing the Subconscious Memory of the Z100
A Fail-Safe Disk-Mount PROLOGUE for HDOS
Sorting on Your Terms, Not the Computer's

YOU NEED *SEXTANT*

Your computer can do a lot for you—*if* you have the support you need. One source of support thousands of Heath/Zenith users rely upon is *Sextant* magazine—the *only* independent magazine about your Heath/Zenith computer. Whether you use an H/Z150, H/Z100, H/Z89, or H8, you'll find articles in every issue which apply to your system.

You can explore MS-DOS, Z-DOS, CP/M, and HDOS in *Sextant*. Applications, programs, compatible hardware and software, and the latest developments in the Heath/Zenith community are among the topics covered in every issue of *Sextant*. Regular features include:

"How-to" articles. Designed to help you enhance your system. Read how other users have altered their systems to suit their needs—and how you can too.

Reviews of products from Zenith and independent suppliers. Written to help answer your questions about hardware and software purchases you're considering.

Short program listings. These include utility programs and games, which you can use immediately.

Advertising by independent suppliers. You'll find many products advertised for your Heath/Zenith system that you just won't find anywhere else.

Coverage of community affairs. You'll read about major events, conferences, and personalities in the Heath/Zenith user community, and what effect they could have on you.

Don't miss all the information packed into each issue of *Sextant*!

SEXTANT
$2.95
May-June 1986
Issue No. 22
The Independent Magazine for Users of Heath/Zenith Microcomputers
Infoworld
Zenith Wins IRS Contract
Computer coups point way for Zenith
SEXTANT
$2.95
March-April 1986
Issue No. 21
The Independent Magazine for Users of Heath/Zenith Microcomputers
EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT THE 8087 . . . BUT DIDN'T KNOW WHO TO ASK
See Seven Sorts in Action
How to Use PROMPT on the '100 and '150
A Quick Look at the Z200
PLUS: BASIC Questions and Answers • C Notes • Z100 Notebook

Start your subscription today!
Call Toll Free:
800/341-1522

(DATATEL 800™, for orders only, Monday-Friday 8 a.m.-9 p.m., and Saturday 9 a.m.-5 p.m., Eastern Time)

Or mail this coupon to:

Sextant, Dept. S27
716 E Street, S.E.
Washington, DC 20003

Please allow 6-8 weeks for delivery of your first issue.

Money-Back Guarantee

Your satisfaction with *Sextant* is completely guaranteed. If at any time you're not completely satisfied, just let us know and your money will be refunded—even for the issues you've already received.

I need *Sextant*!

Send me:

- ☐ 12 issues for $29.91 ($34.50 to Canada)
- ☐ 6 issues for $14.97 ($17.25 to Canada; $21 overseas via surface mail, $35 via air mail)
- ☐ Payment enclosed (checks must be in U.S. dollars payable on a U.S. bank)
- ☐ Bill me
- ☐ Charge my: ☐ Visa ☐ MasterCard

Card # _____

Expiration date _____

Name _____

Address _____

_____

_____

Sextant, Dept. S27, 716 E Street, S.E., Washington, DC 20003

may be the best thing to happen in the Heath/Zenith community in a long time.

Plaintiveness was evident in some HUGgies' voices during the "Buggin' HUG" session Saturday morning. Why did Heath make its catalogue "slick" and take away some of the data HUGgies find important? To appeal to a wider audience, came the answer. What about the '100? Now that production has practically stopped, what will happen to support? Concessions were made that, yes, support may fade away for some '100 users. One user proclaimed in Norma Rae fashion at a seminar, "I will never give up my '100!" His remark was met with loud applause.

Vendors support '100 and '150

Support for both the '100 and the '150 was evident in the vendor booths. Analytical Products had NewWord, a whiz of a word processor created by NewStar Software, now published by MicroPro. NewWord is an improvement on WordStar, also published by MicroPro. The revised word processor can do indexing, and can create macro files that execute a series of commands. It is available in CP/M format for $115, and in a version for the Microsoft Disk Operating System for $195.

Besides the products mentioned above, Kres offered a detachable keyboard for the Z100. They also had on hand a Reset and Font Control Switch for the '150/'160 that allows system reset, and pixel adjustment between graphics and text modes.

Jack Stevenson of San Diego Scientific was selling an enhanced graphics adapter (EGA) card and monitor for the '150 for around $700. He had recently acquired the distribution rights for a line of application programs from Keypunch Software, and they were selling fast. The packages bear names such as People Organizer, Finance, Space Games, and Gambler. At a cost of $9.99 each, the packages seemed a bargain for '150 users. There was also a rumor that Jack had the lowest price in Disneyland on a Gemini emulator board (which lets the Z100 run IBM software).

Around the bend from Jack, Gemini Technologies itself was selling the Sound Board for $29.95, and reiterated plans to release PEGASys+, a graphics adapter card for the Z100 and Z150 series.

ZPC, a software alternative to the Gemini board, was developed by Pat Swayne of national HUG. Pat had an update of his program, and circulated the design for a hardware enhancement to ZPC, called ZHS. The ZHS circuit board is supposed to iron out most of the quirks in displaying IBM-compatible video that ZPC alone will not. (See "IBM Emulation with HUG's ZPC," by Wayne Rash, Jr., on page 42 of this issue.)

EasyPC, from UCI Corporation, is a hardware approach to IBM compatibility. Dr. David Cheung, president of UCI, lectured on the EasyPC at a UCI information session. He compared and contrasted his product with ZPC/ZHS and the Gemini board, and presented to audience members the advantages and disadvantages of each modification. The lecture boiled down to one basic question: How much of an IBM-PC compatible do you want your '100 to be? (For more information on EasyPC, see *Sextant* #25: "IBM Emulation With the UCI EasyPC," by Wayne Rash, Jr.)

Kalltronics, a new face at WRHUGCON, is a dealer of peripherals and accessories for the '89, '100, and '150. Among their offerings were hard-disk controllers, modems, hard-disk drives, and digitizer tablets—pads that can help produce graphics in desktop publishing applications.

Next to Kalltronics, the Pomona and Anaheim HUGs were distributing software from PC Sig (The PC Software Interest Group). Users could choose from among 600 disks containing games, applications, and utilities, all of which were listed in a mammoth printout. Bargain hunters could be sated for as little as $2.50, the cost of one disk full of programs. PC-Sig publishes a newsletter called *PC-Sig News*.

Bob Gray of Graymatter Application Software had his usual assortment of RAM boards and other hardware at discount prices. Bob attracted a good crowd. He must have had good prices, because he was competing with the nearby Heathkit store booth. Jay Miller of Custom Computer Systems was demonstrating High-Five drives, high-density 5¼" floppy drives for the '100.

The SCSI bus: the future of mass storage?

While HUGgies are ironing out the details of HDOS 3, IBM-PC emulation, H89 memory expansion, and just plain surviving in this computer business, the powers that be have crept ahead in their efforts to be thoroughly modern.

Storing mass quantities of data among myriad devices used to be strictly a mainframe concern. In the late 1970s, the SASI (Shugart Associates Standard Interface) became the American National Standards Institute's (ANSI) specification for a general-purpose intelligent interface between a host computer and peripherals. By the early 1980s, this specification had spawned the Small Computer Systems Interface (SCSI). In a nutshell, the SCSI affords micro users the opportunity to store more data and increase system speed by enabling multiple peripheral devices to interface through a host computer adapter and a controller board.

Marc Brooks of C.D.R. lectured on the SCSI (or "scuzzy," as it is endearingly known) at WRHUGCON. C.D.R. is marketing a version of the SCSI bus for the Z100. C.D.R.'s CDR317 Intelligent Interface permits the '100 to use "standard" Heath/Zenith software with Winchester drives of up to 144 megabytes. Manufacturers are incorporating SCSI technology into peripheral devices in anticipation of its widespread use. C.D.R. claims to have foreseen this development, so that the CDR317 won't be obsolescent. Hardware packages were available at WRHUGCON for $650; also available were hard-disk drives of various capacities.

Complete Management Systems, a three-year-old Southern California-based vendor, offered the SCSI Host Adapter for IBM-PC-compatible machines. CMS peripherals have been featured various times in trade publications such as *PC Week*, *InfoWorld*, and *Computer Retail News*. This was their first appearance at WRHUGCON. (Consumers interested in CMS products should go through local dealers, since the company is strictly a dealer-direct distributor.)

It seemed that SCSI was getting a big push at WRHUGCON. Its adaptability to emerging technologies and ability to accommodate faster speed and greater volume make it a quickly growing standard.

The Z386 looks to be a contender in the heavyweight computer wars.

The Z386: Zenith's 80386 foray

One conspicuous absence from WRHUGCON, however, was the machine which should have been the talk of the conference: the Z386.

The Z386 is a 32-bit machine, based on Intel's 80386 microprocessor. It runs at 16 MHz, double the speed of the 16-bit, 80286-based Z248. Zenith is among the first to apply this technology, showing that it wants to get the edge on IBM. IBM has not yet announced an 80386-based machine.

One feature of the Zenith machine is "Slushware"—not a new type of rain gear, but an apt term referring to firmware (a program in ROM) that is loaded into RAM when the computer is turned on. This results in faster operation; it also allows the program to be modified before execution. The machines probably won't be cost-accessible to the consumer in the immediate future since, at $6,499, the price tag just may outweigh the computers.

Not much was said at WRHUGCON about the Z386, despite its recent introduction and Zenith's big press release about it several days earlier. Herb Friedman briefly mentioned it as part of

his tribute to Heath/Zenith machines at the banquet; Chas Gilmore briefly mused on the possibility of a '386 kit; and T.D. Engineering offered a bus that would accommodate the 80386 technology.

The T.D. product, in fact, is one of the first available supporting the 80386 technology: a bus for the '150/'160 that can accommodate eight-, 16-, and 32-bit code.

Aside from these rumblings, however, there wasn't much discussion of the '386 in Disneyland, most likely due to its sheer "newness." After all, there isn't any software exclusively for it yet. In any event, the Z386 looks to be a contender in the heavyweight computer wars.

The answer is: support

The question: What keeps Heath computers alive?

Heath needs HUGgies, and HUGgies need Heath. Both hardware and software hackers have an understandable emotional attachment to their machines, and seem to view Heath as a parent. Unfortunately, Heath's link to Zenith doesn't help. Some users feel that Zenith has become the Dick Dastardly of the kit builder's world—for having made Heath travel the IBM route. Moreover, some of them feel that Zenith has churned out machine after machine with little follow-up support and little concern for the "little guy."

At an information session at WRHUGCON, Chas Gilmore stated that Heath generally supports machines for seven years after they go out of production. Some users were suspicious of this assurance; some others were not happy with a seven-year limit. But users need not feel abandoned; there will always be someone around to sustain an older machine.

The road not taken

Disneyland is accessible from the Disneyland Hotel by Monorail, a 1960s mode of transportation that somehow never became widely used. The Monorail was designed to travel at speeds of up to 80 miles per hour, but age and wear have reduced its optimum speed to 15-20 m.p.h. In its day, it was a marvel. The technology has a lot of potential, but it has never caught on.

I couldn't help wondering, as I looked down at Frontierland and Tomorrowland from the Monorail, if HUGgies felt the same about the H8.

Suppliers Mentioned

Analytical Products
213 Teri Sue Lane
Buellton, CA 93427
805/688-0826

C.D.R. Systems
7210 Clairemont Mesa Blvd.
San Diego, CA 92111
619/560-1272

Complete Management Systems
401 West Dyer Road
Santa Ana, CA 92707
714/549-9111; 714/549-4810

Custom Computer Systems
P.O. Box 797
Lyons, CO 80540
303/823-5394

Al Davis
187 Lake Chapin Road
Berrien Springs, MI 49103
616/471-1792

Gemini Technology
13227 N.E. 20th Street
Bellevue, WA 98005
604/274-1283

Graymatter Application Software
1601 Township Line Road
Norristown, PA 19401
215/279-4460

HUG Office Bulletin Board
616/982-3956

Kalltronics
P.O. Box 1157
Agoura Hills, CA 91301
818/707-2921

Keypunch Software
1221 Pioneer Building
St. Paul, MN 55101
612/292-1490

Kit Builder's Journal (order #KBJ-2000-NM), $9.95/6 issues.
Heath Company
Box 1288
Benton Harbor, MI 49022
800/253-0570

Kres Engineering
P.O. Box 1268
La Canada, CA 91011
818/957-6322

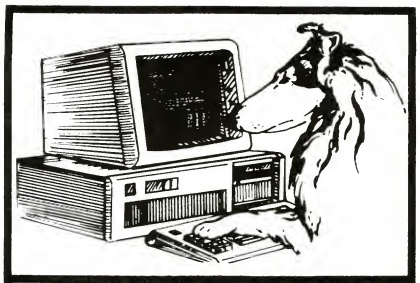
Bill Parrott
7010 Caenen Avenue
Shawnee, KS 66216

PC Sig
1030D East Duane Avenue
Sunnyvale, CA 94086

San Diego Scientific
815 Third Avenue
Chula Vista, CA 92011
619/425-2262

T.D. Engineering
13941 Olive Mesa Court
Poway, CA 92064
619/271-1077; 619/748-8529

UCI Corporation
948 Cherry Street
Kent, OH 44240
216/673-5155; 800/UCI-COMP



Well-Behaved Software

ANNUITY,
(as seen at CHUGCON): **$19.95**

- Loan Payments
- Savings Deposits
- Interest Rates
- Amortization Tables
- Investment Analysis

Other Reasonably Priced Programs For:

- Real Estate (Automated Market Analysis)
- Accounting
- Production Management
- Machinery Controller-Emulator

Available for: H/Z-89, Z-100, IBM PC Compatibles

P.C. ENTERPRISES
P.O. Box 1269
Annandale, VA. 22003
(703) 941-4006

Circle #219 on Reader Service Card

SOFTWARE FOR ALL ZENITH COMPUTERS
H8, H89, H100, H150, H248

PERFECT PRINTER
Electric typewriter (2 modes) PLUS 7 print functions.....**$19.95**

PAYCHECK
Payroll program with multiple wages, salaries, tips, federal taxes, and MORE! Prints checks, quarterly/annual reports.....**$39.95**

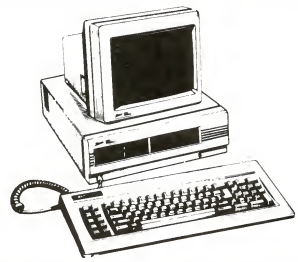
MT ACCOUNTANT
Organizes financial data by account or date. Easy to use!.....**$19.95**

PERFECT FUNDS
Manage your money market and stock funds! Tracks performance of each fund and your entire portfolio. A must for today's market!.....**$29.95**

PERFECT MONEY
Calculates loan costs, payments, interest, and balloon payments.....**$19.95**

ORDER NOW by writing or calling:
Micronics Technology
(904) 897-4257
449 Barbados Way
Niceville, FL 32578
We accept checks, Visa, MasterCard.
Shipping and handling: $2.
Florida residents add 5%

Circle #208 on Reader Service Card



THANKS A MILLION

Thanks a Million to the hundreds of you who participated in our now famous **One Million Dollar Zenith Software Sale.** Of the 49 values in the original offering, only 17 remain. They are listed below at "give away" prices. Many new items are in this ad. We especially want to point out the new items from the UCI Corporation and the SmartWatch from FBE Research. Please **MAIL** or **PHONE** your order today and expect prompt service. **MASTERCARD** and **VISA** gladly accepted with no additional charge.

★★★ ZENITH SOFTWARE FOR THE ★★★ Z-100 SERIES COMPUTERS

Zenith packages with software, manuals and registration cards for the original Z-100 computer series (not for the IBM compatibles).

PART NUMBER	DESCRIPTION	LIST PRICE	SALE PRICE
MS-463-1	Z-Basic (16 bit) interpreter	$175.00	$24.00
MS-463-7	Multiplan	$195.00	$24.00
CB-463-11	Z-Chart	$150.00	$15.00
CD-463-2	Condor File Manager	$299.00	$24.00
PK-100-4	All 4 listed above	$819.00	$62.00
MS-253-1	Microsoft BASIC-80 (8-bit)	$175.00	$24.00
OS-53-2	CP/M-85 (8 bit)	$150.00	$24.00
OS-63-4	Z-DOS	$150.00	$35.00
CB-463-9	PECON Peachtree to Condor	$99.00	$15.00
RS-463-1	Peachtree General Ledger	$399.00	$38.00
RS-463-5	Peachtree Inventory Management	$499.00	$38.00
RS-463-75	PeachText 5000	$395.00	$77.00
SC-463-1	SuperCalc	$195.00	$38.00
WI-463-1	Remote Batch Terminal Emulator	$899.00	$28.00

★★★ ZENITH SOFTWARE FOR THE ★★★ Z-150/160 SERIES COMPUTERS

PART NUMBER	DESCRIPTION	LIST PRICE	SALE PRICE
RS-463-75	PeachText 5000	$395.00	$77.00
BP-5063-71	BPI Series Self-Training	$69.00	$25.00
BP-5063-8	BPI Personal Accounting	$195.00	$55.00

★★★ ZENITH SOFTWARE FOR THE ★★★ H/Z-89 SERIES COMPUTERS

PART NUMBER	DESCRIPTION	LIST PRICE	SALE PRICE
HES-837-1	Microstat (96 TPI)	$249.00	$40.00
HCP-837-1	Pearl #3 Program Generator (96 TPI, Requires C-BASIC)	$450.00	$40.00

★★★ ZENITH MONITORS ★★★

ZVM-1360 Long Persistance 13" High Res $586.00
ZVM-1330 Color 13" High Res., RGB only $437.00
ZVM-1220 Amber Non-Glare Flat Screen $99.00
ZVM-1230 Green Non-Glare Flat Screen $99.00
ZVM-1240 Amber Flat Screen TTL input $158.00
ZVM-1200 Tilt Swivel Base $17.00

★★★ ZENITH IBM COMPATIBLE COMPUTERS ★★★

ZF-158-41 One 360K floppy disk drive, 256K RAM, color ready. Retail $1999.00, Payload $1394.00

ZF-158-42 As above with two floppy disk drives and 256K RAM. Retail $2199.00, Payload $1519.00

ZW-158-42 As above but with 20 MEG Winchester Drive and one floppy disk drive. Retail $2799.00, Payload $2040.00

ZFL-171-42 PORTABLE with Backlighted LCD screen, 256K RAM, two 1/3 height 360K disk drives, ROM based software, Approx. 14.3 lbs. Retail $2399.00, Payload $1342.00

ZF-181-42 LAPTOP PORTABLE with the amazing Supertwist LCD backlit screen. 640K RAM, two 720K 3.5" disk drives, clock, P&S Ports and more. Retail $2,399.00. Payload $1858.00

ZF-248-81 AT Compatible with one 1.2 MEG Floppy Disk Drive, 512K RAM, 8 Mhz, 0 Wait States. Retail $2999.00, Payload $2191.00. Requires Z-329 or Z-409 Video Card listed below.

ZW-284-82 AT Compatible with all above plus EGA Color Card, one 20 MEG 85 ms Hard Disk Drive. Retail $4399.00, Payload $3062.00

ZW-248-84 AT Compatible with EGA Color Card and all above plus one 40 MEG 30 ms Hard Disk in place of 20 MEG Drive. Retail $5699.00 Payload ..... 3941.00.

All above come with MS-DOS supplied Zenith. Payload charges only $5.00 for shipping of prepaid orders. We can enhance the above computers with more memory or larger winchester drives at low costs to you.

★★★ UPGRADE ACCESSORIES FOR Z-150/160 ★★★ SERIES COMPUTERS

SmartWatch from FBE Research. Installs in ROM Socket on CPU Board in Zenith computer series Z-100/150/158/160. This tiny jewel of a product contains a ten year battery and keeps your computer informed of both time and date at each boot-up. Complete instructions and software included $44.00

MEMORY KIT #150-256-18. Includes a ZPAL chip which allows use of 256K RAM chips included (18 pieces 256K 150 ns RAM chips). Kit increases 128k memory to 640K or 256K memory to 704K. All chips plug into your existing Zenith Memory Board. Unbelievable but true $87.00

Winchester Hard Disk Drive Internal Set-up. Includes Winchester drive, controller/interface card, cables and all hardware. With 20 MEG (formated) drive $478.00. May be installed in Z-148 using an Expansion Card sold below.

PTZ-148 Expansion Card for Z-148. Includes 2 expansion slots plus a clock/calendar. $129.00

Winchester Hard Disk Drive External Set-up. Includes Winchester drive, controller/interface card, power supply and case with fan. With 20 MEG (formated) drive $668.00

SECOND INTERNAL DISK DRIVE with instructions and hardware $112.50

EVERCOM INTERNAL MODEM. Fully Hayes compatible 1200/300 baud with powerful BitCom software included $163.00

★★★ VIDEO CARDS ★★★

Z-171-3 Z-171 Video Card RGB/Comp $189.00
Z329 High-Resolution Monochrome $182.00
Z-409 Color Graphics/Monochrome for Z-200 ..... $205.00

★★★ UPGRADE ACCESSORIES FOR Z-100 ★★★ SERIES COMPUTERS

COLOR GRAPHICS UPGRADE. All memory chips (16 pieces 150 ns) required to update Z-100 Series computer for color. Installation instructions included. Order Memory Kit #100-64-16 ..... $21.50

MEMORY UPGRADE. All memory chips (9 pieces 150 ns) required to upgrade from 128K to 192K RAM. Installation instructions included. Order Memory Kit #100-64-9 ..... $12.50

ZMF100A by FBE Research. A modification package which allows 256K chips to be used on the old-style motherboard to reach 768K. Simple assembly with no soldering or trace cutting. Compatible with Easy PC and Gemini Emulator. $60.00 alone or $148.50 with 27 256K RAM chips included.

SmartWatch by FBE Research. If you don't have a clock for your Z-100, get this one. More details under Z-150 upgrade listings $44.00

GEMINI EMULATOR BOARD. Makes the Z-100 compatible with the IBM PC library of programs $432.00

UCI EASY PC. IBM PC Emulator. Makes your Z-100 IBM Software Compatible. Full 8 MEG operation, color graphics and audio compatible. Retail $699.000, Payload $477.00

UCI EASY 87. Add an 8087 Numeric Coprocessor. $69.00 for the board without an 8087 Chip. With 5 MEG 8087 $197.00 or with 8 MEG 8087 installed $234.00

UCI MEMORY UPGRADE CARD. We recommend this one highly. The board has sockets for up to 2 MEG of RAM. With no RAM installed $328.00. With RAM installed and fully tested, 512K $387.00, One MEG $446.00, Two MEG $564.00 Add $35.00 for EasyDrive RAM Drive Software if desired.

UCI RAMSAVER. Maintains power on UCI MEMORY CARD RAM when computer is off. Save your programs in RAM with your computer off. Payload $177.00

UCI EASY-I/O. S-100 board that provides IBM PC communications port compatibility with your EasyPC. Easy I/O-1, One Serial Port $91.00. Easy I/O-2, Two Serial Ports, One Game Port, Clock-Calendar $127.00

UCI EasyWin. Winchester Drive Systems at reasonable prices. Complete Hard Disk Systems for mounting inside your Z-100. Systems complete with Seagate Drives, 21 MEG $745.00, 31 MEG $865.00. System without Dirve $277.00

CDR Z-100 SPEED MODULE. Run your Z-100 Computer at 7.5 MHz. Installs easily with no soldering. Externally switchable between Speed and Normal mode. Payload $48.00

★★★ UPGRADE ACCESSORIES FOR H/Z-89 ★★★ COMPUTERS

Magnolia Microsystems Double Density Controller. Soft-sectored disk controller. Supports up to four each 5.25" and 8" disk drives. Complete with cables, installation instructions and CP/M ' ... $294.00

Magnolia Microsystems Memory Upgrade Card. Installs in your H-89 to increase memory from 48K to 64K. Payload price $50.00

INTERNAL DUAL DRIVE SETUPS. Includes two half height double sided disk drives and all hardware and connectors required to mount inside your H-89. Steel mounting shield/case included.
MITSUBISHI MF501 Setup, 48 TPI, 6 MS seek, 320K $279.00
MITSUBISHI M4853 Setup, 96 TPI, 3 MS seek, 640K disks .. $284.00

★★★ HALF HEIGHT FLOPPY ★★★ DISK DRIVES

MITSUBISHI M2896	8"	48 TPI DS/DD	1.2 MEG	$375.00
MITSUBISHI M501	5.25"	48 TPI DS/DD	320K/360K	$110.00
MITSUBISHI M504	5.25"	96 TPI DS/DD	360K/1.2 MEG	$177.00
MITSUBISHI M4853	5.25"	96 TPI DS/DD	640K	$130.00

★★★ SEAGATE HARD DISK DRIVES ★★★

ST-225 20 MEG Winchester Hard Disk $393.00
With Western Digital Controller & Cables $478.00
ST-238 30 MEG, Requires RLL type controller $424.00
With Adaptec RLL Controller & Cables $528.00
ST-4026 20 MEG High Speed for Z-200 ..... $588.00
ST-4038 30 MEG High Speed for Z-200 ..... $669.00
ST-4051 40 MEG High Speed for Z-200 ..... $859.00
ST-4096 80 MEG High Speed with Software $1425.00

★★★ POWER SUPPLIES AND CASES FOR DISK DRIVES ★★★

Rugged steel construction with heavy duty power supplies. Purchase with drives and we will install drives in case.
Single 5.25" unit for Full Height Drive $68.00
Dual 5.25" unit, specify Full or Half Height $92.00
Dual 8" unit with fan, for Half Height Drives $188.00
Face plate for single drive in dual case $8.00
For WINCHESTER Drive, with fan $191.00

★★★ CHIP SPECIALS ★★★

The finest RAM available and at PAYLOAD prices. Order one to one thousand chips and add only $2.00 for shipping.

64K Dynamic RAM, 150 ns ..... $1.35 each
256K Dynamic RAM, 150 ns ..... $3.28 each
256K Dynamic RAM, 120 ns ..... $3.87 each

V-20 CHIPS. High Speed NEC V-20-8 8088 replacement. These run at up to 8 MEG and are said to increase CPU speed 10-30%.
Payload $14.75

8087 MATH COPROCESSOR CHIPS. Speeds and improves numeric processing. 5 MEG 8087-3 .... $129.00, 8 MEG 8087-2 .... $165.00

★★★ TOSHIBA PRINTERS ★★★

The new generation printers are here. The Toshiba 3-in-1 printers offer high speed draft quality, near letter quality and high-resolution graphics using an advanced 24 pin dot matrix print head.

	RETAIL	PAYLOAD
P-321-P Parallel	$699.00	$509.00
P-321-PS Parallel and Serial interfaces	$749.00	$547.00
P-321 Tractor Feed	$99.00	$78.00
P-341-PS Paralled & Serial, Wide Carrage	$1149.00	$699.00
P-341 Tractor Feed	$199.00	$166.00

MasterCard

PAYLOAD
COMPUTER SERVICES

VISA

15718 SYLVAN LAKE, HOUSTON, TEXAS 77062
PHONE (713) 486-0687

Your satisfaction is guaranteed. All hardware carries a 90 day warranty. VISA and MASTERCARD orders accepted. Add $5.00 to all prepaid orders for handling and shippng, we pay the balance. Actual shipping costs billed for net billing orders to approved accounts. We accept purchase orders from schools, government and approved accounts. Mail or Phone your order for prompt service.

Circle #147 on Reader Service Card

Z100 Notebook

William N. Locke

Doodler

Mouse Pack

SmartWatch

Interlace graphics and ED48

Code Corner: changing the key map

. . .the monitor data area

. . .the monitor key table

. . .the display table

. . .the KEYMAP program

. . .using command-line input

Doodler

After several years with the Z100, I finally have the whole family fighting to use the computer. What could have brought six kids running?

Doodler. I recently received Paul Herman's neat graphics program and also his mouse driver. I may need to lock the computer in a vault to keep the peanut butter and jelly out of the keyboard.

Well, actually, I actively encourage our children to play with the *family* computer—and this program is a kid catcher. (It also caught my wife and me.)

Doodler is a graphics editor for making two-dimensional pictures, saving the pictures to a file, printing them out to any graphics-capable printer, or saving them in compressed form as disk files. The user is allowed to treat screen sections as separate "frames" which can be moved, saved, copied, reversed, rotated, or painted.

One of the nicest attributes of Doodler is that it can put almost any size letters on the screen in a variety of fonts. This capability makes Doodler useful for creating all sorts of posters or announcements. My wife and my daughter, who is a cheerleader, quickly devised a handout that said "Beat Gators," with a picture of an alligator.

We may well be the duty poster makers forevermore.

The program comes with a set of fonts that includes Gothic, Roman, script, and outline characters. There is also an optional library of additional fonts to go along with Doodler. (Doodler itself costs $99; the optional font library is available for $29.95.)

Doodler has recently undergone major changes, and the current package is version 5. I will go over the major differences between the old versions and the new version. Paul Herman was kind enough to give me a detailed rundown on these differences. (An early version of Doodler was covered in *Sextant* #17, July-August 1985. See "Affordable Graphics for the Z100," by Marilyn Harper.)

The new version of Doodler supports the system used by MS-DOS versions 2.0 and later for assigning subdirectory path names. You can use MS-DOS's SET command to establish default path names for the Doodler picture, character-font, printer-driver, and playback files.

Playback is the repetition of previously recorded Doodler commands to remake a screen picture. It is an alternative technique for storing and reproducing graphics, and it requires less disk space than recorded screen files.

The new Doodler screen files use a compression routine, so they are far smaller than in previous versions of the program.

Nine separate "frames" may be used on the screen at once. (The previous versions of Doodler allowed only one frame.) These frames are working areas that you have chosen to move, copy, reflect, rotate, etc.

Doodler now allows "rubber-banding." So, you can mark the center of a circle, for instance, and then make it grow and shrink by moving the cursor—allowing exact adjustment before it is finalized. Doodler supports the use of lines, boxes, circles, ovals, and arcs in this mode.

The area-filling, or painting, routine has long been a feature of Doodler. A new feature known as "texturing" has been added to allow an enclosed area to be filled with a pattern that is defined in another frame. As an example, you can draw an alligator, draw a separate frame with scales, and quickly fill the alligator with scales.

One of the most original new features of Doodler is the Magnify mode. This makes it possible to blow up a section of the screen near the cursor, draw on that section in a pixel-by-pixel manner, and then return to normal with the detailed design placed in the picture at the cursor location.

There is one recommendation that I would have for future development of Doodler. It would be nice if a frame could overlap the screen edge without losing information. As it is now, if you make the mistake of overlapping the screen edge with a moved or rotated frame, the frame will be chopped off when moved back.

The program does have an "undo" feature that allows you to fix such a problem; but it would be nice to be able to move a large frame off the screen, out of the way, while working on other sections of the screen, and then be able to move it back unchanged.

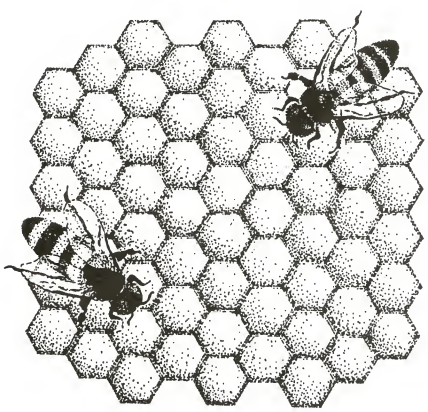
As noted, Doodler costs $99; previous Doodler owners can update to version 5 by sending in $29.95 and either the registration form, a copy of the bill of sale, or the distribution disk.

The plain bottom line is that Doodler is one fine program. I strongly recommend it to the young and old. Your computer will have a waiting line once the news is out.

Mouse Pack

In addition to Doodler, Paul Herman also has written Mouse Pack—a superb

Beyond IBM PC Compatibility:



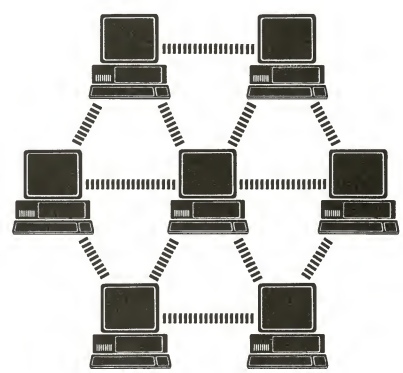
Z-100 users who are ready for PC compatibility, should keep one thing in mind. The future. New, state-of-the-art PC software is creating ever greater performance demands on computer hardware. Large scale, memory intensive programs for networking, graphics, number crunching and communications are quickly becoming the rule, not the exception. But software is only as good as the system that runs it.

EasyPC will run it all.

Even the newest copy-protected best sellers. That's because you actually boot up PC hardware, not software translation routines.

EasyPC runs faster, too.

Faster than an IBM PC, faster than a Z-150, and faster than any other emulation scheme you can buy.



EasyPC will support a fully integrated Local Area Network System (LANS) of Z-100's, PC's and AT's communicating at 115Kbaud.

Networking is now a reality for Z-100 users.

EasyPC will fully support a network of up to *sixteen* Z-100's, PC's and AT's. EasyPC is the core of an integrated system of components that includes RAM expansion, I/O, math co-processing, hard disk subsystem and more. For serious users, it's the only choice.

Ask to see an EasyPC in action.

Visit your Heath/Zenith Electronics Center or independent UCI dealer and see how easy it is to turn your Z-100 into a PC compatible system. For the name of your nearest dealer, just call 800-UCI-COMPUTER.

EasyPC is a trademark of UCI, Corp. Z-100 and Z-150 are trademarks of Zenith Electronics Corp.
IBM and IBM PC are trademarks of International Business Machines.

CORPORATION

948 Cherry Street, Kent, Ohio 44240
(216) 673-5155 / 800-UCI-COMPUTER

Circle #180 on Reader Service Card

mouse driver package for the Z100. This program costs $29.95, and allows the Z100 to use a mouse in its serial port. The Microsoft Serial Mouse and the Mouse Systems PC Mouse are both fine. You can easily configure the buttons on the mouse to act as any Z100 keys, and you can adjust scaling and dampening to make drawing easier.

I happened to have a Mouse Systems PC Mouse, so I used it to test this program. I plugged it into port J2, ran the program, tried it with Doodler, and it worked. It was just that simple.

When you move the mouse, the arrow-key codes are injected into the Z100 as if they had been typed. Some other available mouse device drivers will work only if the Z100's expanded (ESCape code) keyboard mode is used. Mouse Pack will work whether or not the user's program employs keyboard expansion.

I once read somebody's comment that using a mouse is like trying to draw pictures in the sand with a rock. It is, indeed, not easy. Nonetheless, drawing with a mouse sure beats drawing with the arrow keys.

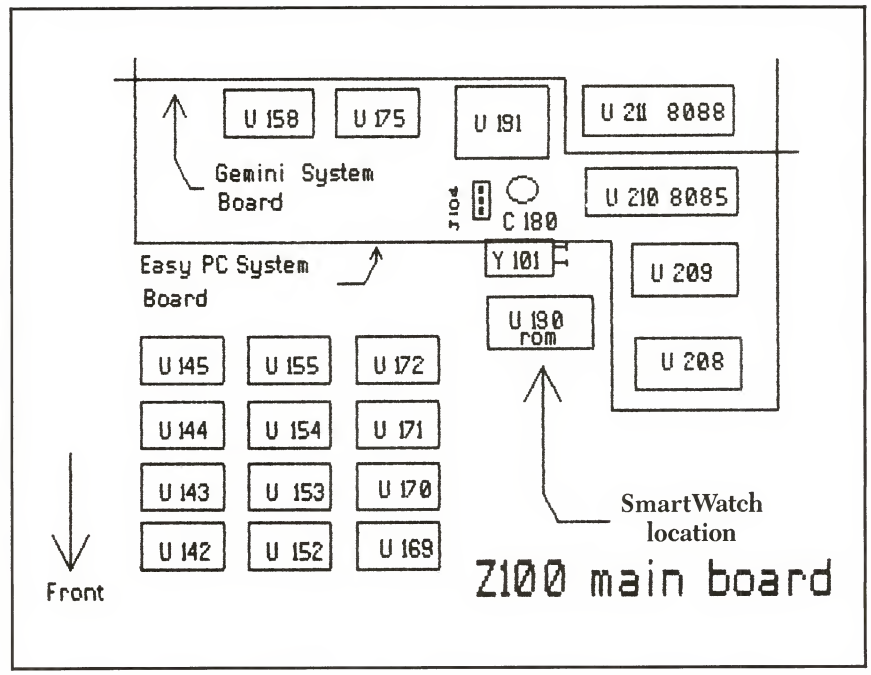


Figure 1. The SmartWatch clock/calendar is installed at chip U190 on the Z100 main board. Remove the Z100's ROM chip from this location; after SmartWatch is installed, the ROM chip is plugged back in on top of it. SmartWatch doesn't interfere with either the Gemini emulator board or UCI's EasyPC.

SmartWatch

A few months ago, I decided to spend the money and buy myself a clock board for my Z100. I called the FBE people and asked for a ZCLK.

Well, I was startled at the answer.

"Why? There's a better one on the market."

Certainly a low-pressure sales approach. Following that conversation, FBE gets my vote as a customer-oriented company.

The device FBE was talking about is the "SmartWatch" from Heath. I purchased one through RAM Technology for $59.95. (Since then, FBE has put together its own SmartWatch package.)

The SmartWatch is physically a simple device. The entire circuit is built into an integrated-circuit (IC) chip socket. The SmartWatch plugs into the socket for the read-only memory (ROM) chip at location U190. (See Figure 1.) The original ROM chip then plugs into the top of the SmartWatch.

Under normal circumstances, the ROM is available for its usual functions. But when the support program CLOCK or RDCLOCK is run, the software accesses the SmartWatch, either sets or reads the time as appropriate, and then switches the SmartWatch back out.

When the computer is on, this device is connected to the computer's power supply. Otherwise, it is powered by a carefully sealed lithium energy cell. The switching logic to make the power selection is contained within the SmartWatch, and the manual advertises a ten-year life on the energy cells. (I will attempt to test this life in my Z100 and let you know the outcome.)

The timekeeping itself is done by a CMOS chip that acts as a watch. (CMOS stands for complementary metal-oxide semiconductor; it's a particularly low-power chip type, used in many watches.) When a complicated, predetermined data pattern is noted on the SmartWatch pins, the chip switches on, cuts out the ROM, and provides its time and date output.

Heath has supplied the source code for the low-level routines used to make SmartWatch work. These are given in assembly language, and the higher-level source code for the CLOCK program is given in C (for use with the Computer Innovations C86 compiler).

SmartWatch comes with a disk containing support software.

CLOCK.EXE will both set and read the SmartWatch clock.

You set the date and time by simply typing the following on the command line:

CLOCK HH:MM:SS MM/DD/YY XX

Here HH is the hour, MM is the minutes, SS is the seconds. The date is in the usual format (month/day/year), and XX is the first two letters of the day of the week.

If you simply type CLOCK with no other entries, the program will display the current SmartWatch settings.

RDCLOCK.EXE is much smaller than CLOCK, and is used to read the SmartWatch for updating the system clock. This file is designed to be called by the AUTOEXEC.BAT file so that it will automatically update the computer before you start working.

There is also the source code mentioned above, and a program for demonstrating the SmartWatch.

The SmartWatch works equally well in all of the following machines: Z100 series, Z138, Z148, Z151, Z158, and Z161. This is a rare treat in hardware compatibility. As Figure 1 indicates, the SmartWatch can be used in a Z100 with the UCI EasyPC or the Gemini emulator board. Their system boards do not cover the portion of the main board containing the ROM chip.

I certainly recommend this product. It can be ordered through local Heath stores or from RAM Technology.

Interlace graphics and ED48

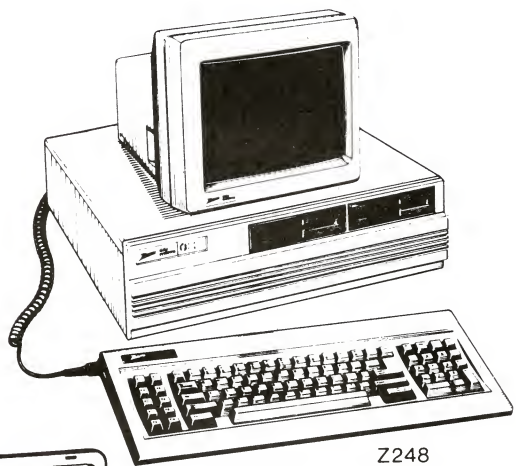
One feature of the Z100 that gets discussed from time to time is the interlace mode. This video mode doubles the number of horizontal scan lines. First, it paints the screen with the normal number of horizontal scans (225). Then it goes back and paints scan lines in between those of the first pass.

You get twice as many horizontal lines, making individual pixels impossible to distinguish in the vertical direction. This mode also allows for a complicated mixing of colors, permitting a host of shades.

Few computers on the market have such flexibility. Unfortunately, though, by the time the second pass is underway, the dots of the first part may have already started to fade. The result can be an annoying screen flicker. (Using a high-persistence screen can get around this.)

Up until recently, I had not been aware of any software authors who made use of the interlace mode. The flicker usually keeps people away. However, there is now one company, Friendliware, that is

First Capitol Delivers Zenith. Your Way.

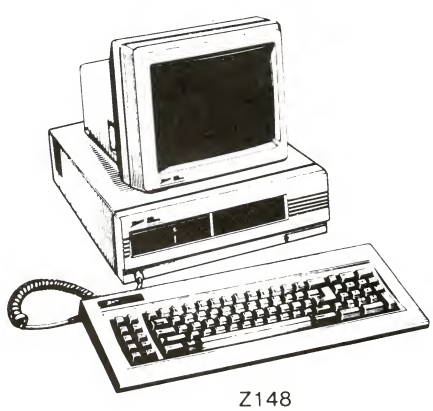


Z248

Z181

Specialists in

AutoCAD Systems
Local Area Networking



Z148

ZENITH | data systems

AUTHORIZED SALES AND SERVICE

Have it your way.

If you're looking for a PC, you couldn't do better than Zenith. And you couldn't buy your Zenith at a better place than First Capitol. We'll put together a system the way YOU want it. And we'll do it for a price that competes with the guy who just sells boxes that fall on his loading dock.

Great Prices. And A Great Machine.

We're committed to Zenith. And to you. the standard Zenith models that come from the factory are a good buy. And we'll be glad to sell you one at a price that will match anyone. But if you want the full potential, we'll fix it up for you. Larger disk drives. More memory. Internal tape back up. Removable winchesters. All at a budget pleasing price.

We make Zenith Scream.

When a new model comes out, we're among the first to get it. Our Zenith fanatics take it apart, prod it and poke it until it screams for mercy. Then we put it back together (usually with some new parts) so that it REALLY screams. With power.

You'll be back.

Check with us. Check elsewhere. We'll put together a custom quotation for you we GUARANTEE you'll find interesting. We think you'll come back to us. There's a reason for the growing list of companies, government agencies, and end users that know us as the source for Zenith. Your Way.

First Capitol Computer

1106 First Capitol Dr.
St. Charles, MO 63301

1-800-TO-BUY-IT (800-862-8948) Orders and quotes

1-314-724-2336 Technical support and order status

The StockSystem Challenge.

We will meet or beat any dealer's price on new stock Zenith systems. And for enhanced systems, no one can touch our combination of value, performance, and custom service.

Before you buy . . . . . .

Call Us First. And Last.

Circle #206 on Reader Service Card

heavily involved in making use of interlace. They may very well be the experts in the field.

(Friendliware is the company that brought to the CP/M world the fine puzzles Disarm and Atlantis. They say that the former has been solved, but that the latter, an adventure game based in the Greek islands, never has been. When I tried Atlantis, the computer told me that I had gotten my map wet while swimming. On the first day out hiking, I became hopelessly lost. I may retire to the Greek islands yet. If you are a CP/M user, I recommend these puzzles.)

The major new interlace product from Friendliware is an editor named ED48. Using a special character font, this editor displays 48 lines of text on the screen. None of the characters in this font has descenders, so line crowding is reduced.

The display uses a blue background with letters in black (the absence of color). The user cannot change this color scheme.

All menu selection is accomplished using on-screen help messages displayed in the right margin of the screen. This is possible because the displayed characters use only seven pixels, rather than the standard width of eight pixels. Doing so leaves room for the help-message strip, even with an 80-column screen.

Having twice as much information available on the screen is a particularly interesting feature. Programming is certainly easier when you can view twice as much code at one time.

ED48 is a good programming editor. It has all of the usual features of a modern editor, including: search and replace, find, assignment of two function keys to execute macro commands, tab setting, file inclusion, and directory viewing from within the editor.

Some features are not as well developed in this editor as they are in the BSE editor, which comes with the Programmer's Utility Pack. BSE allows 26 macros to be assigned, and a significant number of files can be edited at the same time.

ED48 gives you an Oops key for undoing the most recent key actions in many cases.

ED48 is also not as quick at reproducing the screen as is BSE. However, considering the fact that ED48 is completely redoing the normal way of business on the screen, the speed difference is certainly not a major fault.

The other side of the comparison between BSE and ED48 must be included. BSE displays only 24 lines, and it has some known bugs that can cause a crash; ED48 did not crash while I used it. ED48 does not have word wrap; BSE does, but that mode is an area of great risk. Every time I have used BSE's word processing mode, I have regretted doing so. (With BSE's word wrap, writing paragraphs longer than about 250 characters locks up the system.)

ED48 features the ability to copy, rename, date stamp, or delete files from within the editor. These features are helpful. They can be lifesavers when the file being edited grows beyond the space remaining on the working disk. ED48 gives you an Oops key for undoing the most recent key actions in many cases.

ED48 has a handy "prefix operation" (preop) feature that allows many commands to be repeated. The desired number of repetitions is input using the numeric keypad on the Z100.

The preop feature is also used to specify a number in commands requiring numerical input. As an example, ED48 uses SHIFT-F12 to set or clear a tab. The command 25 SHIFT-F12 would set or clear the tab at column 25.

ED48 allows conversion among decimal, hexadecimal, and binary numbers from within the editor. Also, it displays the ASCII and H19 graphics characters.

The feature that is most likely to cause the user to have a strong opinion about ED48 is the black-on-blue color scheme

$99 BUSINESS BOARD

24 hour business information center using modems at 300/1200/2400 baud. Has a multi-level menu system that is easily customized with no programming req'd. Includes remote PC operations and integrated data base management. Source code additional charge.

$99 PC COMMX $119 CP/M

Emulates VT100, Wyse, HP, ADM, TV, IBM, ADDS, file transfers: KERMIT, XMODEM, COMMX mainframe, Telex/TWX. Instant DOS/foreground switch! Unattended macro controls and 700 entry dial directory. Electronic mail sub-system!

$59 C DATA ENCRYPTION

Data Encryption Standard (U.S. government standard FIPS PUB46) in Microsoft "C". Includes compression & telecomm formatting, allowing for faster transmission & storage on any computer or service. Complete "C" source code provided for additional $249.

HAWKEYE GRAFIX Inc
Box 1400, Oldsmar
Florida 33557
Call 813-786-8161

Circle #217 on Reader Service Card

NEWWORD - the better word processor by NewStar Software

This fine word processor can be considered a clone of the popular WordStar program and it even uses the same commands. However, NewWord is faster, easy to customize, has the mail merge feature built-in, supports more printers, has an UNDELETE function and excellent documentation. It also includes the **WORD Plus** spelling checker by **Oasis** — an excellent product in itself! version 3 includes Macros and other enhancements. We offer this package at a discount. Just check the prices below.

Available in most computer formats including Heath hard sector and BIOS-80.

30 Day Money-Back Guarantee!

CP/M 80 ..... $145
MSDOS or CP/M 86 ..... $195
MSDOS version 3 ..... $275

Add $3 per order for shipping and handling.
Terms: Check or Money Order — VISA/MC — COD.
California residents add 6% tax.

ANALYTICAL PRODUCTS 805/688-0826
213 Teri Sue Lane Buellton, CA 93427

mentioned above.

I have never felt that a color monitor is acceptable for word processing. I prefer a small green or amber screen. Most color monitors seem to be large, and the large letters are hard to use for very long.

The ED48 pattern solves that problem. The letters are small and particularly clear.

On the other hand, the user will need to be careful about lighting in the computer room. The light from fluorescent lamps interferes with the screen pattern, making it unreadable. And any lighting that is too bright will wash out the screen.

It is possible to get used to looking at a solid blue screen. Friendliware recommends using desk lamps with 60-watt light bulbs rather than overhead lighting. This does not help during the day when sunlight rules the world, but at night a significant improvement is gained.

Friendliware is developing a user's guide in addition to the detailed User's Reference Manual currently distributed on disk with ED48. The current price of ED48, $60, makes it a highly competitive product for Z100 users with color monitors. You must also have 64-kilobit memory chips installed on the Z100 video board. The interlace flicker would be significantly worse if you were using your Z100 in a region of the world using 50-hertz power.

Also, this company sells several other products that demonstrate the power of interlace. One interesting program, COLORGEN, allows the user to experiment with various color tint mixes. Others, LACE and LACE87, are superb public domain graphics demonstration programs. These are the most interesting uses of the Z100's graphics that I have seen.

Friendliware should consider development of a graphics editor. They clearly have a greater understanding of the Z100's graphics capabilities than most of us do.

Code Corner: changing the key map

Last summer a fellow Z100 user, Mark Goodman, sent me a question:

Is it possible to change the functions of the Z100 keys so that they will have different values than the key-cap labels?

I had never thought very long about this question before, but Mark got me going. In fact, MS-DOS's FONT utility has a provision for remapping the keys, but this is not good enough. Each time the computer is booted, the FONT utility has to be run to set up the keys as desired. And FONT does not allow entering the changes from the command line. Alternatively, you could use a modified ALTCHAR.SYS file on your boot disk, but this could not be reset without a reboot.

After some searching through the tables in the Programmer's Utility Pack documentation, I found the information

ZDRAFT FOR Z100

New Features:

- Print-to-file lets you print your drawings on any MSDOS system, OR create drawings for WatchWord™ to include in text documents.
- Read text files into drawings.
- Read plot data from files.
- Sideways printing and split printing.

ZDRAFT is a graphics editor that lets you use your dot matrix printer to make high-quality illustrations for articles and reports. Unlike others, ZDRAFT can use all the memory in your Z100 to make drawings much larger than the screen.

This ad is a single drawing made with ZDRAFT and some of the fonts which come with it. The drawing was printed on a Tally MT180L and photographed exactly as printed with no paste-up (reduced 2.3:1).

ZDRAFT is $139.00. Demo disk and manual are $25.00, refundable with purchase. Info and samples are free.

ETTS, Incorporated, P.O. Box 955, Renton, WA 98057-0955
(206) 226-3916

WATCHWORD IS A TRADEMARK OF S&K TECHNOLOGY, INC

Circle #148 on Reader Service Card

MS-DOS & CP/M

CALLIGRAPHY II Printer/Graphics

Our popular CALLIGRAPHY II program is now available for MS-DOS, as well as CP/M & CP/M-85. The CALLIGRAPHY II package includes a screen character editor, the GRAPHICS/TEXT FORMATTER and Font Set 1, a starter set of alphabets, pictures and borders. Available for EPSON and compatable printers. The price of the package including complete manual with tutorial, is $69.00. (Calif. residents please add sales tax.)

The GRAPHICS/TEXT FORMATTER program processes text files created with your favorite text editor or word processor to create documents with mixed text and graphics on your dot matrix printer. (This ad was produced using the GRAPHICS/TEXT FORMATTER.) It goes beyond most word processing systems in its ability to mix our custom fonts and graphics with standard text. Among the features are filling, centering and easy control of overlays and borders.

Expand the library of fonts and graphics by ordering Font Sets 2, 3 and 4 at $19.95 each. You can also create your own with the screen character editor.

SKYCASTLE
COMPUTER PRODUCTS
P.O. Box 1412, San Carlos, Ca. 94070

Phone (415) 254-3931

Circle #218 on Reader Service Card

needed to create the mapping program in Listing 1, KEYMAP.

. . .the monitor data area

In order to explain the functioning of KEYMAP, I should start out by explaining that the Z100 has routines in ROM that do most of the low-level handling of the keyboard and screen access. On bootup, these ROM routines set up a data area of tables in memory for reference.

The program in ROM is known as a *monitor*, and the data area is known as a *monitor data area*. The location of data in the monitor data area is found using an offset. As an example, I will be talking about a *key table* that is at offset 091 hex in the monitor data area.

The first step in the detective work required to find these tables is to find the monitor data area in memory. The actual location will vary from one version of the monitor to another; so, providing a single address will not do. The key to finding the segment address of the monitor data area is to look at two adjacent locations in the interrupt table. The interrupt table is at the very bottom of memory with a segment-register value of 0000. The two locations have offsets of 03FE and 03FF hexadecimal.

When you wish to browse the monitor data area, you can use the two numbers found in these locations. Together, they form the appropriate value for the monitor data area's segment address. The location 03FE hex holds the least significant portion of the segment address; the location 03FF holds the most significant portion.

To take a look at these values, call DEBUG, then type:

E 0000:03FE <RETURN>

With my computer, the number 60 appears. Hitting the space bar will let DEBUG display the second number; on mine, it's 04. With those two numbers in hand, you can Q(uit) DEBUG.

Here, the two halves of the segment address are 60 and 04 hex. The segment address value would then be 0460 hex. The specific numbers given here are what I get on my monitor version. They may be the same on your computer, but you should check. The KEYMAP program makes no assumption on this count. It reads the segment value each time the program is run.

. . .the monitor key table

Once we have found the segment value for the data area, we can explore the tables of interest. The *monitor key table* (offset 0091 hex within the monitor data area) consists of 256 locations which contain the initial keyboard values. These values are the hexadecimal key codes listed in Appendix B of the Z100 User's Manual.

Initially, each position has a value that is the same as its displacement from the start of the table. That is, the letter "A" is

Listing 1. keymap.c allows you to change the mapping between the Z100 keyboard and screen so that each key invokes a screen character different from its keycap label. The change may be implemented either in the keyboard map table or in the display map table.

```
/*                              Z1ØØ keymap.c
                                W. N. Locke

To remap Z1ØØ keys use the Hexadecimal codes for the key and
new keys as follows:

keymap <keyboard_num> <new_char_num> <keyboard_num> <new_char_num> ...

or use the printable designations enclosed in single or double quotes:

keymap '<keyboard_sym>' '<new_char_sym>' '<keyboard_sym>' '<new_char_sym>' ...

The following will reset the keyboard:

                keymap reset   or   keymap RESET

If the word "display" is included after either a series of change
parameters  or after the word "reset" the changes will be made to
the Z1ØØ's display table rather than the keyboard map table.

Examples:
     " keymap  9  2Ø  "   will make the TAB key do a SPACE
     " keymap  9  9   "   will return a TAB to the TAB key
     " keymap 'a' 'b' 'b' 'a' display "  swap 'a' and 'b' display

Note: Key codes will not appear changed at the  operating  system
level.

The  Desmet compiler was used for this code.  For other compilers
change the _peek() and _poke() functions as necessary.

The Hex method of entering values will work  for  "Function"  and
other  keys.    The Key Hex values are given in Appendix B of the
Z1ØØ User's Manual. */

#include <stdio.h>                  /* Standard C input/ output definitions   */
#define INT_TABLE_SEGMENT  Ø        /* MS-DOS Interrupt Table location        */
#define MTR_DATA_SEG_LOC   Øx Ø3FE  /* Offset of monitor Data pointer address */
#define MTR_KEY_TABLE      Øx ØØ91  /* Offset of the Monitor key table        */
                                    /* in the monitor data segment            */
#define KEY_TABLE_LEN      255      /* Length of the monitor key table        */
#define DISP_KEY_TABLE     Øx Ø191  /* Offset of the Monitor display table    */
                                    /* in the monitor data segment            */
#define DISP_TABLE_LEN     95       /* Length of the monitor display table    */
#define DISP_MAP_OFFSET    32       /* Convert from ASCII to display offsets  */

main(argc,argv)
int argc;
char *argv[];{      /* argv[1] points to keyboard key ( hex ) -| And so on   */
                    /* argv[2] points to new_char_num ( hex ) -|              */

    int mtr_data_seg, key_char, new_char;
    int keymap; /* Change key map if 1; change display if Ø                   */

    /* Build the monitor data address                                         */
    mtr_data_seg = _peek(MTR_DATA_SEG_LOC+1,INT_TABLE_SEGMENT);
    mtr_data_seg =
         (mtr_data_seg << 8 ) |_peek(MTR_DATA_SEG_LOC,INT_TABLE_SEGMENT);
         /* Remember that << n  means shift left n times                      */

    /* If the last command line entry is "display" set keymap = Ø             */
    if(!strcmp( argv[argc-1],"DISPLAY" ) || !strcmp( argv[argc-1],"display") ){
            keymap = Ø;
            --argc;/* The word count is reduced by one to drop off "display */
            }
    else    keymap =1;/* The word "display" was not found, modify key table */

    /* Code to handle the RESET case                                          */
    if( !strcmp ( argv[1] , "reset" )|| !strcmp ( argv[1] , "RESET" ) ){
            if( keymap ){ /* Rewrite the key map table                        */
                 for( new_char = Ø; new_char <= KEY_TABLE_LEN; ++new_char )
                     _poke(new_char,MTR_KEY_TABLE + new_char,mtr_data_seg);
                 printf("The keyboard has been reset.");
                 }
            else{  /* Rewrite the display map table                          */
                 for( new_char = Ø; new_char <= DISP_TABLE_LEN; ++new_char )
                     _poke(new_char,DISP_KEY_TABLE + new_char,mtr_data_seg);
                 printf("The display has been reset.");
                 }
        }

    /* Code to handle the help message                                        */
    else if(argc < 3 ){
         printf("Usage: keymap <keyboard> <new_char> [display]");
         printf(" -OR-  keymap reset [display]\n\n");
```

→

```
        printf("<keyboard> and <new_char> are quoted symbols or Hex ASCII\n");
        printf("Reset will return the keymap to normal");
       }

    /* Code to handle the key or display  mapping                          */
    /* Step through inputs until argc == 1. argc is one greater than inputs */
    else do{

        /* Read off the new characters to be processed right to left       */
        key_char = read_char( argv[argc-2] );/* Right character group      */
        new_char = read_char( argv[argc-1] );/* Left  character group      */

        /* Check for errors on input characters                            */
        if(key_char == -1 || new_char == -1 || key_char>255 || new_char>255){
              printf("Error reading an input character.");
              exit();
              }

        /* Map the new key into the keyboard location                      */
        if ( keymap ){
            printf("The key coded: ");
            printf("%x now holds the code: %x\n",key_char,new_char);
            _poke(new_char,MTR_KEY_TABLE + key_char,mtr_data_seg);
            }

        /* Map the new display code into the table location                */
        else{
            printf("The display coded: ");
            printf("%x now holds the code: %x\n",key_char,new_char);
            key_char -= DISP_MAP_OFFSET;
            new_char -= DISP_MAP_OFFSET;
            _poke(new_char,DISP_KEY_TABLE + key_char,mtr_data_seg);
            }
        } while( ( argc -= 2 ) > 1 ); /* Move right to left two at a time  */
     }

/*                              *** htoi() ***
/* Convert the Hex ascii input string pointed to by s to numbers   */
#define HEX_BASE 16
htoi(s)
char *s;{
        int i;
        i = 0; /* Initialize the return variable to zero.                  */
        do{
          /* Decimal digits case                                           */
          if( isdigit (*s) )  i = i * HEX_BASE + *s - '0';
          /* Hexadecimal digits case                                       */
          else if ( tolower( *s ) >= 'a' && tolower( *s ) <= 'f')
                i = i * HEX_BASE + 10 + tolower( *s ) - 'a';
          else return -1;
          } while(*++s);
        return i;
        }
/*                             *** read_char() ***                        */
/* Read the input characters and determine if they are of the              */
/* form 'X', "X", or 58                                                    */
read_char(s)
char *s;{
        /* If the first character is ' or " return the next letter         */
        if( *s == '\''|| *s == '\"') return  *++s ;
        /* Otherwise return the integer from reading the hexadecimal number */
        else return htoi( s );
        }
```

```
-d 0460:0090 L FF

0460:0090     00 01 02 03 04 05 06-07 08 09 0A 0B 0C 0D 0E    ................
0460:00A0  0F 10 11 12 13 14 15 16-17 18 19 1A 1B 1C 1D 1E    ................
0460:00B0  1F 20 21 22 23 24 25 26-27 28 29 2A 2B 2C 2D 2E    . !"#$%&'()*+,-.
0460:00C0  2F 30 31 32 33 34 35 36-37 38 39 3A 3B 3C 3D 3E    /0123456789:;<=>
0460:00D0  3F 40 41 42 43 44 45 46-47 48 49 4A 4B 4C 4D 4E    ?@ABCDEFGHIJKLMN
0460:00E0  4F 50 51 52 53 54 55 56-57 58 59 5A 5B 5C 5D 5E    OPQRSTUVWXYZ[\]^
0460:00F0  5F 60 61 62 63 64 65 66-67 68 69 6A 6B 6C 6D 6E    _`abcdefghijklmn
0460:0100  6F 70 71 72 73 74 75 76-77 78 79 7A 7B 7C 7D 7E    opqrstuvwxyz{|}~
0460:0110  7F 80 81 82 83 84 85 86-87 88 89 8A 8B 8C 8D 8E    ................
0460:0120  8F 90 91 92 93 94 95 96-97 98 99 9A 9B 9C 9D 9E    ................
0460:0130  9F A0 A1 A2 A3 A4 A5 A6-A7 A8 A9 AA AB AC AD AE    ................
0460:0140  AF B0 B1 B2 B3 B4 B5 B6-B7 B8 B9 BA BB BC BD BE    ................
0460:0150  BF C0 C1 C2 C3 C4 C5 C6-C7 C8 C9 CA CB CC CD CE    ................
0460:0160  CF D0 D1 D2 D3 D4 D5 D6-D7 D8 D9 DA DB DC DD DE    ................
0460:0170  DF E0 E1 E2 E3 E4 E5 E6-E7 E8 E9 EA EB EC
```

Figure 2. DEBUG **printout of a dump from memory, starting at location 41 hexadecimal. The area shown is the monitor key area, consisting of 256 locations which contain the keyboard values. Only the values 20 through 7E hexadecimal represent printable characters.**

in a location 65 places from the start of the table (41 hex). The DEBUG printout of the table is shown in Figure 2.

To make a key yield a new meaning, you only need to change a memory value in this table. To make the "A" key yield a "B", for example, you would only have to put the value 42 hex in the position 41 hex. That is exactly how KEYMAP works.

. . .the display table

There is another interesting table in the monitor data area—the display table. This table tells the terminal what character to display when a particular code is sent to it. It looks just like the key-code table shown in Figure 2. But it starts at offset 191 hex rather than at 91 hex, and only the displayable characters are included. The space character (32 decimal, 20 hex) occupies the zero position in this table.

If you were to change the character at displacement 33 decimal from "A" to "B" in this table, the screen would display a "B" wherever an "A" should appear. I have included the ability to make this happen in the KEYMAP program; but I recommend that you overcome the temptation to use it as a practical joke on your friends.

Here's an example showing the derivation of the display table displacement for the letter "A". "A" is ASCII value 65 decimal (or 41 hex) and SPACE is ASCII value 32 decimal (or 20 hex). The displacement to "A" in the display table is the difference between the two: 33 decimal (or 21 hex).

I can imagine some useful cipher techniques that would depend on this ability. One could dynamically remap the keys and the display sequences with a special word processor, and then play them back the same way. Needless to say, that idea goes beyond this simple KEYMAP program.

In any case, the tables will be reset each time you reboot your computer; but

CLOSE OUT

SALE

OF

GEMINI BOARDS

When these are gone we won't have anymore at these prices. Quantities are limited. Call for current low price.

(804)482-5768

Liberty International

you can include a call for the KEYMAP program in your AUTOEXEC.BAT file and have it run whenever you boot up. I have done this with my Doodler disk so that the shifted keypad codes are the same as the function keys. That makes using Doodler considerably faster.

. . .the KEYMAP program

The KEYMAP program does the following steps:

I. Finds the monitor data segment address by looking in the interrupt table.

II. Checks to see if the modification is to be made to the display or to the keymap. Sets the variable keymap to 1 for key mapping, or to 0 for display mapping.

III. Checks for the reset command. If reset is found, KEYMAP initializes the applicable table to its original state and quits.

IV. Checks to see that the command line had at least two inputs after the program call, KEYMAP. If they aren't there, it displays a help message and quits.

V. Uses a do { . . . } while (. . .) structure to do the actual table modifications. This code repeats for each modification pair specified in the command line. It starts at the numbers on the far right of the command line and works leftward.

As an example, take the input:

KEYMAP "a" "b" "b" "c" "c" "d"

Here, KEYMAP would work through, replacing "c" with "d", "b" with "c", and "a" with "b" from right to left.

The function read_char( ) is used to read either the quoted character or the hexadecimal number representing a key. In each case, read_char( ) provides the result in the integer form required by the program.

The function htoi( ) is used to convert hexadecimal letter-number strings to integers.

. . .using command-line input

The program uses the command line as input, and it might be helpful to review the technique used in C to access this line. Standard C provides a pointer array, argv[n], with each array element pointing to a word in the command line. As an example, the words in the command line MYPROG Your cat is blue would be found as follows:

argv[1] points to Your
argv[2] points to cat
argv[3] points to is
argv[4] points to blue

In the standard Unix version of C, argv[0] would be the calling program's name. MS-DOS does not allow this feature, so the 0th array member is meaningless.

Standard C also provides a total count of command-line words. This is an integer, argc. In the case shown above, argc would have the value 5. To maintain compatibility with the Unix version of C, standard MS-DOS C implementations include the 0th element of the array in the argc count, even though the program name is not available.

As with the other programs carried in this column, I will upload KEYMAP.C and an executable version, KEYMAP.EXE, onto the HUG SIG on CompuServe. In addition, if you prefer, I can send you a copy of both KEYMAP.C and KEYMAP.EXE (and any other "Z100 Notebook" programs) on disk for $20. Mail requests to William N. Locke, P.O. Drawer M, Hampton, VA 23666.

Ordering Information

Doodler V Graphics Package, $99;
Doodler V update, $29.95 (previous bill of sale or distribution disks required).
Mouse Pack, $29.95; Font Library Disk, $29.95; Mouse (Logitech), $99.
Paul F. Herman
Software Graphics Tools
3620 Amazon Drive
New Port Richey, FL 33553
813/376-5457

SmartWatch (model #CB-5063-50), $59.
Heath Company
Benton Harbor, MI 49022
800/253-0570; in Michigan and Alaska, 616/982-3411
or
RAM Technology
427-3 Amherst Street, Suite 265
Nashua, NH 03063
800/662-0070

ED48.EXE, $60; COLORGEN.EXE, $25; LACE87.EXE, $5; DISARM.COM (CP/M), $35; ATLANTIS.COM (CP/M), $40.
Friendliware
P.O. Box 21206
Lansing, MI 48909
517/882-1675 △

The Z-171 with LiteDrive™ ... heavy duty performance in a lightweight laptop

The Zenith Data Systems Z-171 with LiteDrive™ ... heavy duty performance that goes anywhere

Zenith Data Systems and Premier Technologies give the serious PC user convenience and practicality in a completely portable full feature system for *all* your computing needs ... the Z-171 with LiteDrive™.

Now you can have the heavy duty performance of a 10 megabyte hard disk *and* the practicality of a lightweight laptop!

You no longer have to sacrifice features for portability because the Z-171 with LiteDrive™ is a truly compact portable system with full size performance.

This entire full-feature system *including the internal hard disk* weighs only 14.33 pounds. And, LiteDrive™, while adding less than one half ounce to the unit, offers 27 times the memory at up to 20 times the access speed of the standard floppy disk system.

Full Size Performance

Of course, full size performance means you can dash through virtually *any* software program with the Z-171's full MS-DOS compatability. And at the touch of an icon key you can have the added utility of features like a calculator, a world clock and calendar, an appointment schedule book, and a phone book with asynchronous communications capability.

ZENITH data systems

Z-171 + LiteDrive™ Specifications

- 80C88 CMOS processor
- MS-DOS 2.11
- 256K RAM standard (Expands to 640K)
- Single 5.25" DSDD drive
- 10 MB internal hard disk
- Flat 10" backlit LCD
- 25 lines of 80 characters
- 640 x 200 resolution
- Standard QWERTY keyboard
- Serial & parallel port standard
- Optional: RGB video, battery pack, carrying case, memory upgrade, and internal modem
- 14.33 lbs — 9.5 x 13 x 6.6 inches

Complete Graphic Capability

Full graphic capability and excellent visibility are also provided by the full size backlit LCD screen.

Easy input with fewer errors springs from a full size sculptured keyboard. And speedy data entry is *no problem* with features like a full ASCII 128 character set, 4 cursor controls, 10 programmable function keys, and numeric keypad.

Truly Portable

Best of all, LiteDrive™ gives you internal hard disk power *to go*. For computing *anywhere*, the system runs on both AC and rechargable standard battery current, making the Z-171 *truly* portable. Even in the most severe applications safe, reliable drive integrity is assured by an automatic park function.

The LiteDrive™ is both rugged and durable thanks to a 70g shock rating. And for those who admire sheer simplicity, the entire upgrade package is field installable in about 30 minutes.

With the increased speed and storage capacity of LiteDrive™, your laptop becomes a powerful portable phone system when equipped with the optional internal modem. Now you can communicate with the office, other systems, and an endless number of information networks and process data more conveniently *and even faster!*

The Zenith Data Systems Z-171 and Premier Technologies' LiteDrive™ ... a breakthrough in price, practicality, and most of all ... *performance.*

MS-DOS is a trademark of Microsoft Corporation

Premier Technologies, Inc.
1890 McGaw Avenue • Irvine • CA 92714 • 714-261-1184 • Telex 678185

Circle #190 on Reader Service Card

$749 20 Meg Z-100 Winchester

LINDLEY SYSTEMS announces a another reduction in our hard drive pricing. Here are our new prices:

	Internal	External
10 Mbyte	$ 699	$ 799
20 Mbyte	$ 749	$ 849
45 Mbyte	$ 1199	$ 1299
90 Mbyte		$ 2149

These systems include:

- The Konan DGC-2000 Controller
- A Seagate Winchester drive
- Our Software Driver
- Appropriate Cables

KONAN Controller [$ 375 separately]

The Konan controller board is a single slot S-100 card which will connect with one or two ST-506 compatible hard drives. This board contains the latest technology, and requires less space and power than previous controllers. This one board is all you need.

Note that with the Konan board, there are no traces to cut, no ROMs to replace. Just plug in the board and go. Whether you decide to install the drive internal or external, the only tool you need is a screwdriver. (Internally mounted drive units simply replace one of your half-height floppy drives.)

WINCHESTER DRIVE

Our Winchester systems include the ST-213 (10 Mb), ST-225 (20 Mb) or ST-251 (45 Mb) drive units from Seagate.

DEVICE DRIVER [$ 60, Incl. with Board]

Our new device driver supports drive sizes up to 256 Megabytes, with up to 8 partitions, each up to 32 Megabytes. You can use one or two drives (up to 512 Mb on line!) The driver operates under both MS-DOS 2 and 3.

Our hard disk systems are shipped with two versions of the driver software: one for native Z-100 mode, and one for use with the Gemini PC emulator. Any partition can be mounted either under Z-100 mode, Gemini mode, or both. Thus, you can put Z-100 programs in one partition; Gemini programs in another; and your data, shared between both modes, in a third.

LINDLEY SYSTEMS 21 Hancock Street Bedford, MA 01730
(617) 275-6821

Circle #118 on Reader Service Card

FTL MODULA-2 $49.95

The most programming power for your money

FTL MODULA-2 gives you:
- ► Full implementation of MODULA-2.
- ► Split screen, multi-file editor.
- ► Sources to the run-time modules.
- ► Complete support for the product.
- ► 8087 reals available for MSDOS.*

FTL MODULA-2 meets the standards in Niklaus Wirth's book, "Programming in MODULA-2", third edition. No other language gives you better flexibility, code design, or ease of code maintenance.

FTL MODULA-2 gives you compact, rommable code *quickly*. This is the language of the future. If you program in Pascal or C, FTL MODULA-2 will increase your output per programming hour. If you want to learn high level structured language programming, this is the best starting point.

FTL MODULA-2 was named "product of the year" by Jerry Pournelle in his column, "Computing at Chaos Manor", BYTE Magazine, April, 1986.

* 8087 support is an additionl $39.95

FTL Editor toolkit $39.95
The source code to the editor is offered as a toolkit. The editor was written in FTL MODULA-2 and this set of programs provides the novice with working sources to speed up learning. The experienced programmer will find the wealth of pre-written modules a time-saving bonanza.

SAVE $10.00
Buy both the compiler and the editor toolkit for only $79.95. That's a $10.00 savings off the regular price. **FTL MODULA-2 is available for both MSDOS and CP/M-80 systems.**

WORKMAN & ASSOCIATES
USER-FRIENDLY SOFTWARE

SEND CHECK OR MONEY ORDER TO:

Workman & Associates
1925 E. Mountain Street
Pasadena, CA 91104
(818) 791-7979 voice
(818) 791-1013 data M-F 8pm-8am
Or join us on BIX (Byte Information eXchange W.AND.A Conference.)

MasterCard and VISA welcome.
Please add $3.00 Shipping and Handling.
Calif. residents please add 6% sales tax.

Circle #229 on Reader Service Card

BOOKS FROM SEXTANT PUBLISHING COMPANY

Heath/Zenith Users:

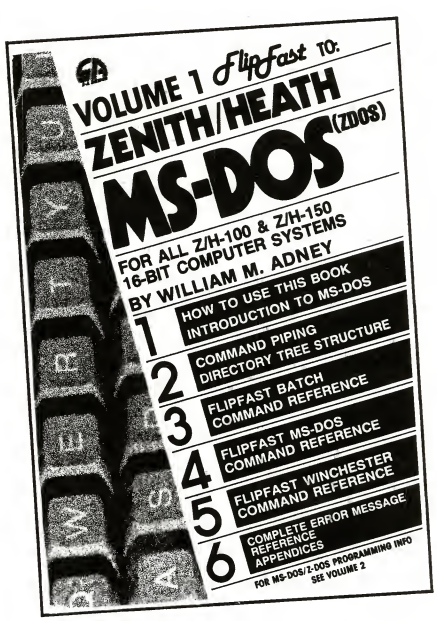
Now you can get the books you need to make your time on the computer more productive—and at drastically reduced prices!

For a limited time, Sextant Publishing Company has lowered prices on the popular *FlipFast Guides* to Zenith/Heath MS-DOS/Z-DOS and Zenith/Heath CP/M-80/85. As an added bonus, we'll send you a FREE copy of *How to Use: Zenith/Heath Computers*, when you buy two or more of the *FlipFast Guides*!

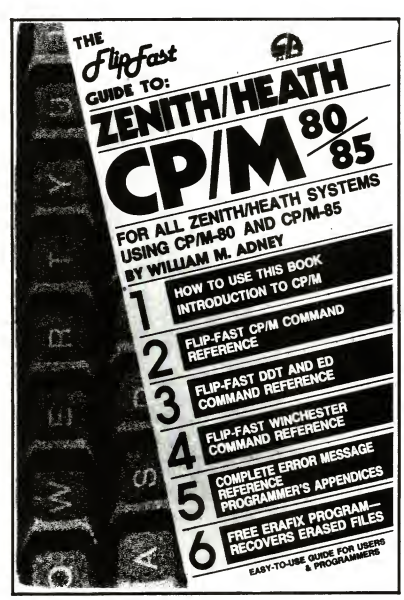
You can buy any combination of the *FlipFast Guides* to get your FREE copy of the *How to Use: Zenith/Heath Computers* book—two MS-DOS books, two CP/M books, or one of each. You just have to buy two books—***at their new low prices***—to get one book FREE!

ORDER YOUR BOOKS TODAY!

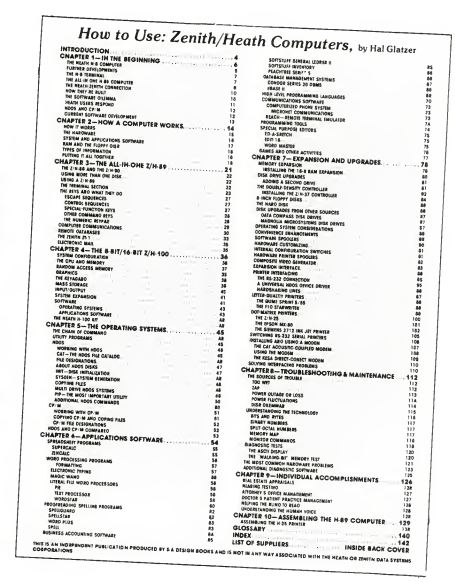
Use the card attached above to order your *FlipFast Guides* and your FREE copy of *How to Use: Zenith/Heath Computers*!


VOLUME 1 FlipFast TO:
ZENITH/HEATH
MS-DOS (ZDOS)
FOR ALL Z/H-100 & Z/H-150 16-BIT COMPUTER SYSTEMS
BY WILLIAM M. ADNEY
1 HOW TO USE THIS BOOK INTRODUCTION TO MS-DOS
2 COMMAND PIPING DIRECTORY TREE STRUCTURE
3 FLIPFAST BATCH COMMAND REFERENCE
4 FLIPFAST MS-DOS COMMAND REFERENCE
5 FLIPFAST WINCHESTER COMMAND REFERENCE
6 COMPLETE ERROR MESSAGE REFERENCE APPENDICES
FOR MS-DOS/Z-DOS PROGRAMMING INFO SEE VOLUME 2

Published at $19.95
Now only $12.95


THE FlipFast GUIDE TO:
ZENITH/HEATH
CP/M 80/85
FOR ALL ZENITH/HEATH SYSTEMS USING CP/M-80 AND CP/M-85
BY WILLIAM M. ADNEY
1 HOW TO USE THIS BOOK INTRODUCTION TO CP/M
2 FLIP-FAST CP/M COMMAND REFERENCE
3 FLIP-FAST DDT AND ED COMMAND REFERENCE
4 FLIP-FAST WINCHESTER COMMAND REFERENCE
5 COMPLETE ERROR MESSAGE REFERENCE PROGRAMMER'S APPENDICES
6 FREE ERAFIX PROGRAM— RECOVERS ERASED FILES
EASY-TO-USE GUIDE FOR USERS & PROGRAMMERS

Published at $12.95
Now only $7.95



Published at $19.95
Now FREE with purchase of two FlipFast Guides

I want to get the most out of my operating system!

Send me

☐ *Zenith/Heath MS-DOS/Z-DOS*
_____ copies @$12.95 each = $ _____

☐ *Zenith/Heath CP/M-80/85*
_____ copies @ $7.95 each = $ _____

+ $2.50 shipping charge *per order* in U.S./Canada = $ _____
or
+ $4.00 shipping charge *per book* sent overseas = $ _____

Total = $ _____

Name _____
Address _____

☐ Payment enclosed (checks must be in U.S. dollars payable on a U.S. bank)
☐ Charge my: ☐ VISA ☐ MasterCard
Card # _____
Expires _____

☐ I'm buying two FlipFast Guides—send me my FREE copy of the book, *How to Use: Zenith/Heath Computers.* (For books sent overseas, please add $4.00 shipping charge to your payment.)

Mail this card today to:
Sextant Publishing Company
716 E Street, S.E.
Washington, DC 20003

27-M/C

I want to get the most out of my operating system!

Send me

☐ *Zenith/Heath MS-DOS/Z-DOS*
_____ copies @$12.95 each = $ _____

☐ *Zenith/Heath CP/M-80/85*
_____ copies @ $7.95 each = $ _____

+ $2.50 shipping charge *per order* in U.S./Canada = $ _____
or
+ $4.00 shipping charge *per book* sent overseas = $ _____

Total = $ _____

Name _____
Address _____

☐ Payment enclosed (checks must be in U.S. dollars payable on a U.S. bank)
☐ Charge my: ☐ VISA ☐ MasterCard
Card # _____
Expires _____

☐ I'm buying two FlipFast Guides—send me my FREE copy of the book, *How to Use: Zenith/Heath Computers.* (For books sent overseas, please add $4.00 shipping charge to your payment.)

Mail this card today to:
Sextant Publishing Company
716 E Street, S.E.
Washington, DC 20003

27-M/C

Send me the *FlipFast Guide* to my Heath/Zenith operating system:

☐ *Zenith/Heath MS-DOS/Z-DOS*

256 pages

☐ *Zenith/Heath CP/M-80/85*

190 pages

Each guide features
- Easy-to-access information for Heath/Zenith users
- Specific information for each operating command or subcommand
- Easy-to-use listings and tables
- Error message listings

To order your copies, fill out the reverse side of this card today and mail it to
Sextant Publishing Co.
716 E Street, S.E.
Washington, DC 20003

Send me the *FlipFast Guide* to my Heath/Zenith operating system:

☐ *Zenith/Heath MS-DOS/Z-DOS*

256 pages

☐ *Zenith/Heath CP/M-80/85*

190 pages

Each guide features
- Easy-to-access information for Heath/Zenith users
- Specific information for each operating command or subcommand
- Easy-to-use listings and tables
- Error message listings

To order your copies, fill out the reverse side of this card today and mail it to
Sextant Publishing Co.
716 E Street, S.E.
Washington, DC 20003

The FlipFast Guide to Zenith/Heath CP/M-80/85

By William M. Adney

For each CP/M command or subcommand you'll find
• required syntax • typical applications • specific examples • command requirements • applications notes • error message listings

You can easily refer to listings of
• CP/M 2.2 system calls 0-40 • BIOS jump table • 8080/8085 op codes • escape sequences and key functions

Plus additional technical information on
• the disk parameter block • disk parameter headers • file control blocks • CP/M memory addresses • contents of first page of memory

Features a 6-page index of error messages

190 pages
Published in 1984 by S-A Design Books

The FlipFast Guide to Zenith/Heath MS-DOS/Z-DOS

By William M. Adney

For each MS-DOS/Z-DOS command or subcommand you'll find
• the name of each command • command syntax • a short explanation of the typical application of the command or subcommand • examples that include an explanation of command function • a list of requirements that illustrate correct/optimum command operation • application notes about specific usage • error message listings

Appendices provide a FlipFast reference to
• EDLIN and all the EDLIN subcommands • a decimal/hex/ASCII/control-key/MS-DOS-call conversion chart • a glossary of terms

256 pages
Published in 1985 by S-A Design Books

How to Use: Zenith/Heath Computers

By Hal Glatzer

Here's the guide to *your* H8, H/Z89, or H/Z100 computer system! Written specifically for users, *Zenith/Heath Computers* is both an introduction to computing concepts for the novice and a reference tool for the expert. It also serves as a buying guide for new hardware and software. Clear presentations of technical information are supplemented with photographs and illustrations. This is not a complicated users' manual!

Now, for a limited time, you can get a FREE copy of this book! Just order two copies of the *FlipFast Guides* to Zenith/Heath MS-DOS/Z-DOS or Zenith/Heath CP/M-80/85. Or get *How to Use: Heath/Zenith Computers* for $19.95 plus shipping.

144 pages
Published in 1982 by S-A Design Books

Send me the books I've checked!

☐ *Zenith/Heath MS-DOS/Z-DOS*
_____ copies @ $12.95 each = $ _____

☐ *Zenith/Heath CP/M-80/85*
_____ copies @ $7.95 each = $ _____

☐ *How to Use: Zenith/Heath Computers*
_____ copies @ $19.95* each = $ _____
+shipping charge ($2.50 *per order* in U.S./Canada; $4.00 *per book* overseas) = $ _____

Total Payment = $ _____

*Buy any two *FlipFast Guides* and you get a **FREE** copy of *How to Use: Zenith/Heath Computers*.

☐ Payment enclosed (checks must be in U.S. dollars payable on a U.S. bank)
☐ Charge my: ___ Visa ___ MasterCard

Card # _____

Expires _____

Name _____

Address _____

_____

_____

Sextant, Dept. S27, 716 E Street, S.E., Washington, DC 20003

Circle #246 on Reader Service Card

The PUP Utilities: Zenith's Useful Tools for the '100, '150, and '200

The Programmer's Utility Pack for MS-DOS 3 includes 22 utilities that may interest you even if you're not a programmer.

William M. Adney

In the previous issue of *Sextant*, I gave an overview of the Programmer's Utility Pack for version 3 of the Microsoft Disk Operating System (MS-DOS). (See "The Programmer's Utility Pack: Useful Tools for the '100 and '150.") For the assembly language programmer, of course, the PUP is a necessity. It contains the assembler, the support utilities, and all the source code for the basic input/output system (BIOS) in Heath/Zenith's implementation of MS-DOS 3. The PUP works with the Z100. And it also works with Heath/Zenith's IBM compatibles—the computers with model numbers from H/Z138 upward.

Despite its name, the PUP is not just for programmers. The documentation alone can serve as an intensive course in what really goes on inside your operating system. Getting similar information from IBM could cost around twice as much as the PUP's price of $225. And some of the information the PUP gives you just isn't available anywhere else at any price.

Moreover, Zenith did not stop with the essential programming tools. They also included a number of utility programs that are unique to Heath/Zenith.

Those 22 utilities are what we'll look at here. Even if you don't program, even if you don't have the time to probe into the operating system, these utilities may make the PUP quite tempting.

The features of the 22 Zenith utilities are covered in Chapter 10—Utilities Guide—of the PUP documentation. I believe these utilities will be of interest to many users. (A number of them are modelled after similar functions in the Unix operating system.)

William M. Adney is a faculty member at the University of Texas at Arlington. He wrote the FlipFast *guides to CP/M and MS-DOS. He's also a computer systems consultant, and writes a regular column for* REMark.

Stand-alone vs. filter

There are two types of programs provided with the PUP. The first is the "stand-alone" type. This is the common type of program that most of us use most of the time. It runs by itself and doesn't require other programs. The PUP contains 12 stand-alone programs (in addition to the BSE editor, which I discussed in the previous issue).

The PUP provides an excellent introduction to the use of Unix-like utilities.

Although I'll talk about it in more detail later, ZDIR is one example of a stand-alone program. It's a neat little utility that provides a completely sorted disk-directory listing in alphabetical order by file name. All you need to do is copy the ZDIR file to your disks, enter ZDIR or ZDIR B:, etc., and you get the sorted directory listing. You don't need to know anything else.

In contrast, the second type of program is known as a "filter." Filters provide Unix-like commands for MS-DOS. Most of the time, a filter would be used to take the output of some other program and modify that output in some specific way.

MS-DOS's MORE utility is one example of a filter. The command line DIR | MORE will send the directory listing to MORE; MORE will then send the listing to the screen one page (24 lines) at a time, waiting for you to hit the RETURN key before it sends the next page.

While using a filter can be quite easy, however, grasping the underlying principles can be a bit more difficult. For some background, you may want to take a look at my column, "On The Leading Edge," in the May 1986 issue of *REMark*.

Let's look at the form I have used to document the syntax each command employs.

Command syntax

Regarding how technical information is communicated, each writer has an individual way of doing the job. However, I have found that some of the command syntax in most of the available documentation is difficult to use.

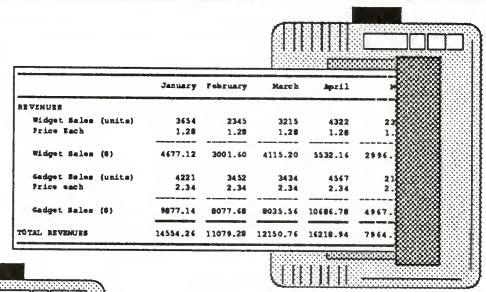
In documenting command syntax, I like to use some standards that I have defined myself; they are slightly different from those adopted by other writers. The following are the standards I will use in this article.

- Uppercase text, digits, and special characters (e.g., MYFILE, *, :) must be input as shown.
- Lowercase characters (outside parentheses) describe user input.
- An item followed by an ellipsis (. . .) indicates that it can be input more than once, if required.
- **Boldface** type indicates items that *must* be input (i.e., not optional).
- Items in normal type and enclosed in square brackets ([ ]) indicate optional items (items that may be omitted). If two

Now REMBRANDT brings great graphics to Heath CP/M users!

TWIST & SHOUT!

Sideways & Banner Printing Utility for Dot-Matrix Printers



	January	February	March	April	M
REVENUES					
Widget Sales (units)	3654	2345	3215	4322	23
Price Each	1.28	1.28	1.28	1.28	1.
Widget Sales ($)	4677.12	3001.60	4115.20	5532.16	2996.
Gadget Sales (units)	4221	3452	3434	4567	21
Price each	2.34	2.34	2.34	2.34	2.
Gadget Sales ($)	9877.14	8077.68	8035.56	10686.78	4967.
TOTAL REVENUES	14554.26	11079.28	12150.76	16218.94	7964.

For *any* CP/M or MS/DOS computer (IBM compatibility is not required), just...

$34.95

***Special Offer:* one MS/DOS and one CP/M version for only...**

$49.95

TWIST & SHOUT! is two great pieces of software at one low price! TWIST lets you print out your spreadsheets (or any file) sideways on your dot-matrix printer. No more cutting and pasting to put together a fragmented printout. SHOUT prints giant banners in letters from two to eight inches high using three special type styles. Make banners, posters and signs with ease. Printers: Anadex, Apple, C. Itoh, Centronics, Data Products, DEC, Epson, Hewlett Packard, IBM, IDS, MPI, NEC, Mannesmann Tally, Okidata, Smith Corona, Toshiba and more! Write for latest list.

Rembrandt

Complete Business Graphics Toolkit™

Finally there's an easy an fun way to create graphics on your H/Z-89, H/Z-90, H/Z-100 *(CP/M only)* computer or any H/Z-19 equipped machine.

No extra hardware required! It works with a standard unmodified machine yet also supports the TMSI SuperSet ROM, and the Font19 Character ROM.

Freehand drawing: You can easily draw lines, boxes, circles and write on the screen in large characters. Full block operations are also supported — move, delete, fill, copy and more! Your graphic creations can be saved to disk and recalled at any time for further editing. Layout forms, design logos, draw diagrams and pictures. It's easy and fun to use.

Business graphics: REMBRANDT lets you create horizontal and vertical bar charts, pie charts and xy plots (scatter graphs). Use hand-entered data or read numerical data from virtually any source including dBase II, SuperCalc, MBasic, Wordstar and ASCII files.

Slide shows: Sequence your graphics on-screen using eleven cinematic special effects like wipes, fades and spirals. Produce electronic 'slide shows' without any programming.

Print your graphics: Print your graphic screens on most dot-matrix and daisy wheel printers. Interface with all word processors so that your reports can include charts, graphs or any graphic creation — intermixed with your text!

Compatible: It even reads, displays and prints *Ed-A-Sketch* files!

Affordable: Even with all of this power, REMBRANDT is available for an amazingly low price of... ***$39.95***

REMBRANDT runs on H/Z-89's, 90's, 100's and H/Z-19 equipped machines.

Solve Computer Incompatibility!

MEDIA MASTER lets your Z-100 computer or IBM compatible (PC, XT or AT) read, write and format up to 140 disk formats. Exchange information and programs with other computers for just **$39.95**.

MEDIA MASTER PLUS
all of the file transfer capabilities of MEDIA MASTER *plus* it gives your IBM compatible the ability to actually *run* CP/M software. All for just **$59.95**.

ACCELERATE 8/16 includes MEDIA MASTER, an upgraded emulator *and* a special easy-to-install NEC V20 chip which lets your IBM compatible run CP/M software at maximum speed. V20 chip and software is just **$99.95**.

Call or write for full compatibility chart

MILESTONE

Business Project Planner

Originally $295 — Now just $99.95!

Never blow another deadline! Whether you're opening a branch office, hiring a sales force or launching a new product, nothing boosts the bottom line like being on time and within budget.

Now plan and execute complex tasks with ease. You first input manpower, costs and time requirements for a series of tasks and MILESTONE does the rest — creates a detailed workplan, identifies critical paths and analyzes alternatives.

INFOWORLD Magazine rated it's documentation GOOD and the program EXCELLENT in performance, ease-of-use and error handling. MILESTONE is available for *all* CP/M, MS/DOS, ZDOS & PC/DOS machines.

T E C H N O L O G I E S, I N C.

22458 Ventura Blvd., Suite E
Woodland Hills, CA 91364

We accept **VISA**, **MASTERCARD** and **AMERICAN EXPRESS**

Order by mail or call our 24 hour toll free order line from anywhere in the US or Canada:

800-628-2828 (Extension 918)

Technical questions, orders: 818-716-1655 (9-5 PST)

Add $4 per order postage/handling. Overseas, add $12. US funds only. CA residents add 6% tax (LA County 6.5%)

Circle #198 on Reader Service Card

MATH TEXT
Version 1.85

The easiest, most natural technical word processor available. Fully what-you-see-is-what-you-get.

$$\int_0^{\zeta} \left\{ \frac{\sin 2\pi\xi}{e^{\xi} + \ell n(5) + 12} \right\} d\mu(\xi)$$

Configurable for IBM compatibles, the Z-100, Tandy 2000, and TI-PC. Many supported printers

Full edition $199
(Usable Demo/Mini Edition $9)
Spelling Checker $29

HUFF Software
410 S. Fraser Street
State College, PA 16801
VISA/MC WELCOME (814)238-0885

Circle #176 on Reader Service Card

EXAM BUILDER
The Most Comprehensive Exam Storage and Generation System on the Market— In Use In Over 200 Major Universities

- Multiple User-Chosen Subjects
- Complete Question Entry/Edit Capability
- Random or teacher-selected items for finished exam
- Single or Multi-Subject Exams
- Printed copy is ready for reproduction
- Master list print capability
- Password protected answer keys
- Zenith, Apple, TRS-80, IBM

School Purchase Orders Accepted
No Time Limit Guarantee

$99.95

(316) 682-0156
A.U. SOFTWARE—DEPT. ST
P.O. Box 8369
Wichita, KS 67208

Circle #130 on Reader Service Card

FREE 52 PAGE CATALOG AND APPLICATIONS GUIDE

AFFORDABLE ENGINEERING SOFTWARE
CP/M MSDOS TRSDOS PCDOS

PDP — Plotter Driver Program
For multi and single pen plotters $72.95

XFER — Transfer Function Synthesis
Transfer functions/ Electronic circuits $72.95

TEKCALC — Scientific Calculator Program
Screen graphics/ Statistics/ Programmable $72.95

COMCALC — Communications Design Spreadsheet
Communications budget calculator $72.95

RIGHTWRITER — Report Proofreader Program
Version 2 — Applies 2,200 rules of English $97.95

ACNAP — AC Network Analysis $72.95
DCNAP — DC Network Analysis $72.95
SPP — Signal Processing Program $72.95
PLOTPRO — Scientific Graph Printing $72.95
PCPLOT — High Resolution Graphics $72.95
LOCIPRO — Root Locus Analysis $72.95
ACTFIL — Active Filter Design $72.95
STAP— Static Thermal Analysis $72.95
MATRIC MAGIC — Matrix Manipulation $72.95

BV Engineering
Professional Software
(714) 781-0252
2200 Business Way, Suite 207, Riverside, CA 92501 U.S.A.

Circle #155 on Reader Service Card

sets of square brackets are shown ([[ ]]), the outer brackets indicate that the item is optional; the inner brackets indicate that if this optional item is used, it must be enclosed in square brackets.

Now let's take a look at the stand-alone programs, since they are the easiest to use.

The stand-alone Zenith PUP utilities. . .AT through DUMP

Like the Zenith APPLY command, the **AT** utility executes a specified command multiple times on a list of files (contained in a source file); but AT has a new twist. It lets you specify a time and/or date when the command processing is to begin. In order for AT to work properly, you must correctly set the current time and date. Perhaps the biggest restriction is that the system does not retain this information when it is powered off, but that is nothing new.

What is a practical use for this command? Probably the most popular is for late-night modem communications—when the telephone rates are the least expensive, and when most of us would rather be sleeping. (For more on this, see Bill Locke's "Z100 Notebook" in the previous issue.)

The **BIN2HEX** command is generally used by programmers to convert a binary file (i.e., a .COM or .EXE file) into the standard Intel hexadecimal format. This is useful to anyone who needs to transfer a binary file to another system with just about any inexpensive communications program. Data transfer in the hex format may be required because some of these programs do not allow binary file transfer.

If you find it necessary to use this utility, be advised that the other system must have the HEX2BIN utility, discussed below, to convert the file back to binary.

BSEMAC is specifically used with BSE to display the contents of a macro file of BSE commands.

If you do much programming in any compiled or assembled language, you will find that the **DO** command can be an incredible time saver. In fact, it appears that the Zenith programmers use this command themselves, since a BIOS.DO control file is included on the disks along with the source-code listings for MS-DOS's basic input/output system (BIOS).

(The BIOS is the interface between the operating system and the computer hardware. It is written by the particular computer manufacturer, such as Zenith or IBM. For Zenith computer systems, the BIOS is IO.SYS, a "hidden" file—that is, hidden from the DIR command.)

The basic need behind the DO command arises from the fact that you frequently have a number of source files that are linked together to form a single load (executable) module. Any time that you change a source module, you must assemble/compile it to produce the object module; then you have to link it and all the other object modules to create the final load module.

What happens, however, if you change more than one source module and forget to assemble/compile it? You'll pick up the old object module in the LINK process, and the program may not be "fixed" the way you expected.

DO will get you out of this problem by checking the date of the executable module that is going to be replaced. It will assume that the files created before the old executable module are still current; only the ones created afterward need to be assembled.

You give DO three things: (1) the name of a "Main" file (the executable module, say); (2) any "Include" files that are needed to execute the series of commands (the files needed in order to assemble the Main file); and (3) the commands, or "Actions," that are to be performed.

Before executing each particular command, DO will check the times and dates of the files; it will execute a particular command only if a needed Include file was created *after* the Main file.

The best way to explain DO is by example.

Let's say you want to assemble and link all files required to create IO.SYS. First, you must use MASM to create object modules from all source files. In order to prevent your forgetting to create new object modules from updated source files, you could create a batch file that would reassemble every single one of the source modules—a *very* time-consuming process. Then, of course, you must LINK all of the object modules to create the final binary file or load module.

How can you save time and still ensure that you "pick up" all of the changed modules? Simple, just use the DO command.

Create a DO control file with all the necessary command lines. BIOS.DO, for instance, includes the following lines:

```
M IO
I BIOS.OBJ
I PBE.OBJ
.
.
.
A LINK @BIOSL
A EXE2BIB BIOS.EXE IONEW.SYS
  <EXEBIOS.DAT
A ERASE BIOS.EXE
```

I haven't shown all of the included files (i.e., those file names preceded by an I), but DO will assemble *only* those source files that have been updated. No need to use a batch file to assemble everything—just use the DO command.

You'll appreciate the **DUMP** utility if you've tried to use the TYPE command to take a quick look at a file created by some of today's word processors (e.g., Microsoft Word). If so, you have seen all kinds

of strange characters on your screen, accompanied by a number of odd beeps.

That's because these files are not straight ASCII files—they contain all kinds of non-printable characters, such as the CTRL-G bell character. You could use DEBUG's D(ump) subcommand to look at the file, but that is not particularly quick unless you can remember the proper syntax. A better way is to use the Zenith PUP's DUMP utility.

The DUMP program displays a file's contents in both hexadecimal and ASCII format, like DEBUG's D subcommand. Although you may not care about the hex format, you can easily read the ASCII contents of the file.

Looking at a file is even more convenient if you use the DUMP utility together with I/O redirection and the MORE utility that comes with MS-DOS. Then you can display one screenful at a time by means of:

```
DUMP ufn > MORE
```

. . .FLAGS *through* ZDIR

I have never understood why MS-DOS did not have a command that was equivalent to CP/M's STAT program. For those of you who have not worked with CP/M, STAT is a general-purpose program that provides a number of very useful features.

One of STAT's very useful features is the ability to change file-attribute flags. Like MS-DOS, CP/M has special attributes that can be assigned to a file. Most files are read/write. Most are also visible with the DIR command; but some, such as IO.SYS, are "hidden" and "system" files.

For an MS-DOS example, the FORMAT program with the /S option adds the BIOS (IO.SYS) and the kernel (MSDOS.SYS) files to a disk, giving them the Hidden and System file attributes. You don't see these files listed on the DIR display because of the Hidden attribute. (The BIOS, kernel, and COMMAND.COM, by the way, are what makes the disk bootable.)

With CP/M's STAT command, you can change file attributes in any way you want. For MS-DOS users, the Zenith FLAGS utility provides those same features and more.

FLAGS allows you to clear the Archive, Hidden, Read-only, and System file attributes. I find FLAGS particularly useful since it allows me to see the way that some software vendors implement copy protection. The trick is that some vendors use Hidden files to "protect" their software. Since these files cannot be seen with the DIR command, COPY cannot get hold of them. (DISKCOPY, however, should be able to successfully duplicate the disk—assuming that the Hidden file is not also located on some "unauthorized" track.)

The **HEX2BIN** utility, mentioned above, converts a file from the Intel hex format back into its original binary form. This assumes that the file was originally converted by the BIN2HEX utility.

The **LS** program lists normal read/write and "special" files that have one or more of the attribute bytes set. This command can be used to display files before the FLAGS command is used to clear the attribute(s). (Unix has an ls command that is similar in function.)

Part of the function of the standard CHKDSK command is to display the amount of random-access memory (RAM) used and free. But, particularly with a hard disk, CHKDSK takes more time verifying the disk-file data. If you only need to know the RAM usage and availability, the **RAM** command provides that information.

RAM is particularly useful if you are using a lot of memory-resident utilities (called terminate-and-stay-resident, or TSRs). It can give you information about the actual memory requirements of each utility so that you can ensure that you have enough memory space left to run your primary application, such as a word processor.

Although most editors have a built-in search-and-replace feature, the **REPLACE** command provides a quick way to perform the same task on a file. In general, I recommend using input/output (I/O) redirection on the output of this command since REPLACE cannot itself create a backup of the modified file. Unless redirected, this utility updates the *existing* file. If you make an error in the command line, you could end up with a completely useless file. (For background on I/O redirection, see "On The Leading Edge" in the May 1986 issue of *REMark*.)

The **TREECOPY** command is used to copy a "tree" of directories/subdirectories *within* a single disk or partition. From time to time, some comments in *Sextant* have noted that it can also be used to back up files by copying the tree to *another disk*. However, I have reservations about using it that way—if for no other reason than that the manual says it can't be done. Sometimes, that's a manual writer's way of suggesting that there may be nasty problems lurking somewhere.

Perhaps the best advice is to use caution with this command until you become familiar with its eccentricities.

The **ZDIR** command is probably the most useful to nearly all computer users. It acts much like the DIR command, but it provides an alphabetically sorted directory listing—with information on the number of files, space used in the current or specified directory, free space remaining on the disk, and the RAM in use and free. That's the normal mode.

If you specify one of the optional switches, you can list *all* files, including the hidden ones (and including special attributes, such as the disk label); get displays sorted by date/time, size, or file type; and/or echo the display to the sys-

HDS

ANNOUNCES
THE Z100 VIDEO ENHANCEMENT
Display 16 colors
Simple software interface

DESCRIPTION

The V1 video enhancement board from HDS will enable your Z100 (not PC) to display 16 colors. This is done by adding an extra bank of video ram. In addition, a palette is provided which maps the 16 colors to any combination of 16. This can be used to create simple animation effects. A disk (MSDOS 2) is provided which contains numerous demonstration programs and subroutines.

INSTALLATION

The V1 board sits above the video board and plugs into the main connector in parallel. In addition, a web is used to obtain 26 signals which are not available through the main connector. The web contains modules and sockets into which certain video board chips are placed. NO soldering or trace cutting is involved.

REQUIREMENTS

A Z100 computer with full video ram (with 64K chips) is needed. To display all 16 colors, an IBM compatible color monitor is required (IRGB).

OPTIONS

To use a composite monochrome monitor, you will need the V1M option.

PRICES

V1: $139.00 V1M: $29.00

Texas residents add sales tax. 30 day money back satisfaction guarantee. MC/VISA accepted. Phone orders taken Mon-Fri, 8AM to 5PM Central time.

HUGHES DEVELOPMENT SYSTEMS
SUITE 400
10101 S. W. FREEWAY
HOUSTON TEXAS 77074
(713) 772-2840

IBM is a registered trademark of International Business Machines.

Circle #109 on Reader Service Card

Need a PAL®
For Your Z-150?

MegaRAM-150™ package allows five banks of 256K RAMs to be installed on standard memory card for over a megabyte of total memory. Resulting memory organized as 640K/704K main and 512K software controlled overlay. Simple installation requires no soldering. Includes software Device Driver to use overlay memory as 512K RAM disk. ***$49.95 each ppd.***

ZP640 PLUS replacement for U455 PAL® allows two banks of 256K RAMs and two or three banks of 64K RAMs to be installed on standard memory board for 640K or 704K total memory (size selected by J401 jumper). ***$24.95 each ppd.***

COM3 package changes COM2 serial port to new port address (3E8H) and thus allows total of three serial ports. COM2 assumed to be on internal modem card or similar device. Printer driver software included. ***$39.95 ppd.***

FBE Research Company, Inc.
P.O. Box 68234
Seattle, WA 98168
(206) 246-9815

PAL® is a trademark of Monolithic Memories Inc.
VISA and MasterCard Accepted.

Circle #102 on Reader Service Card

ATTENTION TURBO PASCAL USERS!
Crash the 64K Barrier

Try **TURBO PACKAGE** now!
90 day money back guarantee!

Modular Programming!

Promotes **REUSE** of working **CODE**
CUTS development **TIME**
IMPROVES system **RELIABILITY**
SIMPLIFIES program **MAINTENANCE**

FILL 640KB with code/data
any way you want

VERY FEW CODE CHANGES.
FASTER than chaining or overlaying

SUPERMATH, FREE!
With purchase of Turbo Package
40 plus LONG (**32-bit math**) routines
Faster than real - big enough for $.
ASM coding insures top performance

Just $49.95 (in TX add tax)

Visa/MCOutside USA add $5.00 shipping
IBM/PC, XT, AT or compatible MS/DOS machine and Zenith Z100

Write or call for more information

CONVERSATIONAL COMPUTER SYSTEMS

5371 Verbena Rd.
San Antonio, TX 78240
Phone: (512) 692-0353

Circle #213 on Reader Service Card

tem printer. This command can be particularly useful if you keep the printed directory listing with the disk. You'll have no question about what files are on that disk and when they were updated.

That concludes the discussion of the stand-alone Zenith utilities. My personal favorite is the ZDIR command, although I regularly use the LS and FLAGS commands for special work.

The Zenith filter utilities

Now it's time to take a look at the filters that are provided with the PUP. Zenith has included 10 of them.

The **MATCH** command is similar to MS-DOS's standard FIND utility, but provides more advanced features. (FIND is kind of "dumb" in that it only looks for an *exact* string match—no other options are available.)

MATCH can identify a string pattern using the \? character as a wild card in a specific position. It works just like the ? wild card in MS-DOS ambiguous file names. In addition to the pattern-matching capability, it also has several optional parameters that are useful. All valid pattern characters and optional parameters for the MATCH utility are shown in Figure 1.

The **PREFIX** utility reads an ASCII file and prefixes each line with a specified string. As with most of the utilities, you can optionally create a file with the results or append the new information to an existing file.

So, for instance,

```
PREFIX "MODIFIED LINE" < FNAME1.EXT >
  FNAME2.EXT
```

would add the string MODIFIED LINE to the beginning of each line in FNAME1 and write the resulting file to FNAME2.

You can use **RMCOL** to read an ASCII file and remove one or more unwanted character columns in it.

The RMCOL utility can be particularly useful for creating lists of file names for input to commands such as APPLY or AT. For example, let's say that you are using the hard disk on one of Heath/Zenith's IBM compatibles—drive C:. You're currently logged onto a subdirectory that you would like to copy to a floppy disk for backup purposes. So, you would like to create a list of files (called BACKLIST) to use with the APPLY (or AT) command. That way, you can use a command like the following:

```
APPLY BACKLIST "COPY % A:"
```

That command will allow you to copy specific files (those contained in the BACKLIST file) to drive A:. Creating BACKLIST, however, could be a real chore.

Here is an easy way to do it. First, enter

```
DIR > BACKLIST
```

to create the file. Since it has file sizes, dates, and times, we need to remove them. The file specifications take up the first 12 columns, and since the screen display is no more than 80 columns wide, we can use the command:

```
RMCOL 12 67 <BACKLIST >BACKLIST.NEW
```

As given here, RMCOL will delete 67 columns, starting at the *13th* column. The starting number should be the number of the column *before* the first column you wish to delete.

(The arithmetic may not be obvious from this command line. One way to look at it is to think of the first column as column *zero*; the 80th column would be column 79. So the first column we'd want deleted would indeed be column 12. And 12 plus 67 would equal the number of the highest column.)

By the way, it is always a good idea to create a new file (as in BACKLIST.NEW), just in case you make a mistake in the RMCOL command line.

After using RMCOL, you can edit BACKLIST.NEW, easily delete any lines you do not want, add the period between file name and extension if necessary, and save

MATCH

MATCH "**string-pattern**" < [d:][path]**ufn** [>[>[d:][path][ufn]]][/C/F/N]

Application: Finds and matches a specified string pattern in a file, displays the specified "match" lines on the CRT, and optionally creates (>) a new file or appends (>>) the information to an existing file. Pattern matching is performed using the following:

- \\ Match a backslash character.
- \? Match any character in this position.
- \B Match a Blank (i.e., space) character in this position.
- \D Match a Decimal character in this position.
- \H Match a Hex character in this position.
- \W Match any Whitespace (i.e., blank or tab) in this position.

Optional parameters for this command are:

- /C Case ignored (i.e., upper and lower case are equivalent).
- /F Names of files containing a match are displayed.
- /N Non-matching lines are displayed.

Figure 1. MATCH is one of the filter utilities provided with Zenith's PUP. All valid pattern-matching characters and optional parameters are shown. The string pattern to be matched can include the \?—which acts like a ? wildcard in a DIRectory file-name specification.

the file.

After editing, you can delete the old BACKLIST file and rename BACKLIST.NEW to BACKLIST for use with the APPLY command as shown above.

The **RMEXT** utility can read an ASCII list of file names and remove the EXTension from the file name (the .TYP in FILENAME.TYP). There are some interesting possibilities for using this command. For instance, you could use the command

LS *.COM

to get a directory listing of selected .COM files, pipe it to RMEXT, and then append the "cleaned" list to a batch file, which would include it as a series of command lines.

Next, there's **SPCTAB**. In order to conserve file space, it is sometimes useful to be able to convert spaces (1 space = 1 character) to a TAB character. Remember that MS-DOS's TAB character (9 decimal) can take up to eight spaces on the page, with MS-DOS's standard tab-set positions (columns 9, 17, 25, 33, and so on).

SPCTAB will substitute a single TAB character for spaces wherever possible, thus saving as much as seven bytes with each substitution. That allows you to effectively "compress" a file if that file contains a lot of spaces. By the way, you can "reconvert" the TABs to spaces by using the TABSPC utility, discussed below.

The **SUFFIX** utility is similar to PREFIX. SUFFIX reads an ASCII file and appends a string to the end of each line. You can also create a new file with the results or append the suffixed file to another existing file.

As mentioned above, the **TABSPC** utility converts the TAB character to the correct number of space characters. Recall that the standard MS-DOS definition of the TAB character lets it take up as many as eight spaces. TABSPC can be used to "uncompress" files that were previously converted with the SPCTAB utility.

The **TEE** utility provides a very useful feature when you are using a number of other utilities—it allows you to view the intermediate results of a piping operation so that you can see what is happening.

For example, consider the following command line:

DIR | SORT

Although we are all familiar with the DIR command, you still might want to see the standard DIR display as it will be sent to the SORT utility. You can do so with TEE, using the following command line:

DIR | TEE | SORT

Many editors used for programming use the "insert" (vs. overwrite) mode as a default. As you program, it is not unusual to have a number of space and/or tab characters at the end of the line (depending on your editor and the changes that you have made). The **TRIM** utility allows you to delete that "whitespace" at the end of each line.

Although that may not seem to be particularly important, consider that the extra whitespace characters also require file space for storage. The TRIM utility may allow you to save significant disk space depending on the file and how it was edited.

The **UNIQ** utility simply reads ASCII input and eliminates any duplication in adjacent lines.

A speculative conclusion

As I've mentioned before, MS-DOS version 2 and later has a number of Unix-like features—specifically including I/O redirection and command piping. The trend now in MS-DOS seems to be toward providing features that Unix has had for some time.

In some cases, this trend includes commands that are nearly identical in function to their Unix counterparts. For example, MS-DOS's MORE utility is functionally equivalent to Unix's more command; only the syntax is slightly different. Unix also has find and sort commands that are quite similar in many respects to their MS-DOS counterparts.

It is fairly obvious that Heath/Zenith must have a few programmers who are familiar with Unix (and/or Xenix, Microsoft's derivative); the PUP contains a number of utilities that have functions, and sometimes names, like some of the Unix commands. For example, the PUP has the AT utility, which provides time-date sensitivity (like Unix's at); it has the TEE utility (functionally identical to Unix's tee), and the UNIQ program (similar to the Unix uniq).

In short, I believe that the trend in MS-DOS will continue to provide more Unix-like features. Even without the PUP, I/O redirection and piping are already part of the basic MS-DOS system, as are the basic FIND, MORE, and SORT utilities.

It is even more interesting to speculate about the future of MS-DOS, regardless of whether it will be A-DOS (Advanced DOS), MS-DOS 5.0, or MS-DOS 286/386. It is especially interesting to note that Unix and its derivatives (such as Xenix) already have multi-user and multitasking capability—which many believe will be part of Microsoft's new operating system, whatever its name will be.

Regardless of Microsoft's plans, the PUP provides an excellent introduction to the use of Unix-like utilities. Some industry experts still maintain that Unix and its derivatives will become the operating system of the future. Even if that is not true, I think that these utilities will provide a number of useful functions.

Ordering Information

MS-DOS Version 3 Programmer's Utility Pack, model #CB-3163-30, $225.
Heath Company
Benton Harbor, MI 49022
800/253-0570; in Michigan and Alaska, 616/982-3411 △

UCI PRODUCTS:

Z-100 Motherhood Upgrade
Add the new motherboard logic and 8 MHz speed without cuts or soldering - *$139*

EasyPC IBM PC Emulation - *$479*

EasyI/O IBM Communication Ports — 2 serial, 1 game, clock calendar - *$129*
1 serial - *$97*

Easy87
Coprocessor Board - *$69*
w/5 MHz 8087 - *$179* w/8 MHz 8087 - *$225*

EasyWIN
Hard Disk System for Z-100, 10 MB - *$695*
20 MB - *$735* 30 MB - *$799*

EasyRAM Memory Board
2 MB - *$564* 1 MB - *$446* *512K - $387*
Bare - *$326* RAMDrive software - *$39*

RAMSAVER
Maintains power on EasyRAM card when computer is turned off - *$169*

Z-148 Expansion Chassis
8 slots, cable, power supply, transmitter and receiver boards - *$329*

FBE PRODUCTS:

ZMF100a — 768K Old Motherboard Upgrade - *$59*

ZRAM-205 — Z205 Memory Card 1 MB Upgrade - *$42*

SmartWatch — Calendar/Clock - *$43*

FLOPPY DISK DRIVES Teac 55BV, 360K - *$110* Teac 55BV for AT - *$119*
Teac FD 55 GFV for AT, 1.2MB - *$159*

LIGHTEK
P.O. Box 6493 • Kent, OH 44240
(216) 673-5358

Circle #177 on Reader Service Card

Z150/160
HARDWARE ENHANCEMENTS

TurboPlus V2.0

-Increases CPU clock to 7.4MHz
-Quicker than an 8MHz Z-158
-Software AND
hardware speed select
-Keyboard AND hardware reset
-100% Software compatibility
-Simple, reversible installation
-Includes software, PC board, V-20, and high speed chips
- Price $125 ppd. -

VMM150 Video Mod.

-Use ANY video card in 150
-REMOVE Heath/Zenith card
-Free 1 standard slot
-Less heat - less power
-Simple plug-in installation
- Price $45 ppd. -

TERMS: Check or money order
UPS COD add $1.90
15 day Money Back Guarantee

For complete information on both products, write:

Dante Bencivengo
P.O. Box 234
Wyandotte, MI 48192

Circle #193 on Reader Service Card

The Eight-Bit World

Walter J. Janowski

Anniversary card

It's here!

96-t.p.i. disk drives—update

Alternative boot and FORMAT options

Disk cataloging

Bits and pieces

Anniversary card

Seems as though *Sextant* is five years old this issue. A lot of water has gone under the bridge in the past five years, and we might do well to reflect for a few moments upon the times gone by.

Five years ago, the H89 was an active part of the Heath/Zenith product line. H8 owners were beginning to grumble that support for their machine was dwindling. Just a few months later, a lot of us would be drooling over those snazzy new machines that ran something called Z-DOS. IBM's domination of the market was just getting under way. *REMark* still looked like it was being printed in somebody's basement. (And to be honest, I still prefer the way it looked back then.)

Owning a microcomputer was a different experience back then. "User-friendly" was just becoming a popular buzzword, but programs that ran right out of the box were still few and far between. Building a computer from a kit still meant soldering components onto circuit boards, and required knowledge of a few more tools than a screwdriver. And most important, if you really wanted to use your computer, you had to *learn*.

It was a time when the average computer user knew more than where the power switch was and how to interpret little pictures of trash cans and file cabinets. The computers were often overpriced and of little practical value, but they provided an opportunity for intellectual stimulation previously unavailable to the home hobbyist. You felt good because, if you wanted the darn thing to work right, you just plain had to sit down and figure it out.

During a brief period of trying to sell microcomputers for a living, and later to a lesser extent while doing this column, I noticed a disturbing trend. More and more of the newer users viewed their computers as they would a coffee pot. Take it home, plug it in, and it makes coffee, right? Read a manual? Forget it! Think? Understand? User friendliness was supposed to eliminate all that, right? We can even use little pictures (why not call them "icons"?) so that we don't even have to be able to read English!

That's probably why we die-hards still using our H8s and '89s (and let's shove over and make some room here in the old folks' home for those '100 owners who are on their way) seem like such eccentrics to some clone owners who can't understand why anyone would still use such an "obsolete" machine.

The key to unleashing the power of a machine is understanding it. That's why so many software wizards have been able to squeeze such wonders out of these humble little 64K clunkers.

But I digress. Is there still a place for eight-bit machines? I would have to say yes. As long as the desire for knowledge and learning can overshadow the flash and shine of those snazzy new wonders, as long as someone takes the time to consider whether or not the function required is being performed, as long as we still sneer at the challenge: "It can't be done with only 64K!", we'll be here for a long time to come.

By the way, (just for the record) "The Eight-Bit World" is one year old this issue. Thanks to all of you for your letters and support.

It's here!

HDOS 3.0 is here!

There were some last-minute delays after the announcement at HUGCON. To his credit, Bill Parrott would not ruin the credibility of HDOS by releasing a semi-functional or bug-ridden copy before it was ready.

The complete HDOS package is quite large, around one megabyte total. In hard-sectored H17 format, it takes up seven disks. You can obtain it on disk directly from Bill for $25. That may be the easiest alternative for many of us. (For H17 users, that's not much more than the cost of the disks alone.)

Alternatively, you can download it "free" from HUG's office bulletin board at 616/982-3956. According to Jim Buszkiewicz, system operator of the HUG board, the total package will be condensed into a single file using an MS-DOS-based archiving utility. That means that to obtain the package, you must first download the archived file onto an MS-DOS machine (!) in order to extract the individual files. Next, since there are few MS-DOS-to-HDOS file transfer programs, you will probably have to transfer the files onto a CP/M-compatible system. At that point, you must use a CP/M-to-HDOS transfer utility to finally obtain usable HDOS code.

I can understand that HUG wants to distribute HDOS 3 in the most efficient manner, but I think the bulletin-board route will be useful only for local HUGs that want to download it to their library. (And calling the bulletin board in St. Joseph means long-distance rates.)

Now that HDOS 3 is released, I think it's the duty of the eight-bit user community to develop a workable distribution system. It's probably going to require the ability to produce disk copies at the local

ANALYTICAL PRODUCTS

805/688-0826

213 Teri Sue Lane Buellton, CA 93427

CALL OR WRITE FOR CATALOG **PRICES SUBJECT TO CHANGE**

Terms: Check or Money Order — Visa, M/C — C.O.D.
Add $3 per order for shipping and handling
California residents add 6% tax

We Support the H89!

EMULATE - H89 breaks format barrier!

Purchase CP/M software from vendors who do not support Heath disk type. Handles these disk formats:

Actrix	Eagle II	NCR DecMate 5	Televideo
Altos	Epson QX-10	NEC PC-8001A	TRS80-1 CP/M
AMPRO	Fujitsu CP/M86	Osborne 1	TRS80-3 CP/M
Beehive Tpr	IBM CP/M86	Otrona	TRS80-4 CP/M
CDR Systems	IMS 5000	PMC MicroMate	Xerox 820
Cromemco	Kaypro II	Royal/Triumph	Zorba
DEC VT180	Magnolia	Sanyo 1100	
DEC Rainbow	Morrow MD	Superbrain	

H37 version includes formatting capability.

H89 or H8 with H37 .....$59
For CDR BIOS 2.91 .....$49

4MHz mod for H89

Easy to install plug-in module. No trace cutting or soldering required. Includes CP/M software.

Assembled and tested — specify disk format..$45
HDOS software .....$ 5

6MHz mod for H89

Provides maximum high speed performance presently available for the H89 or H89A.

Assembled and tested — specify disk format..$59

REP3 — Automatic Key Repeat

Modernize your H89 or H19. Hold any key down for half a second and the key begins repeating. Simple plug-in installation.

Kit.....$35
Assembled $45

TIM2 — Real Time Clock

Installs in the left hand expansion slots of the H89. Includes battery backup. Requires soldering 4 wires to the CPU board.

Kit.....$65
Assembled and tested $75
Software on disk — specify format $10

DATESTAMPER

Product of Plu*Perfect Systems. Provides automatic time and datestamping for CP/M 2.2 files.

For CP/M — specify disk format.....$45

CDR Super RAM 89

Main board w/512k RAM $239
System w/Megabyte RAM.....$369
Expansion Board w/512k $133
Real time clock option .....$ 45
SCSI hardware/software option $160

CDR Controller for H89

FDC-880H — include CP/M s/n.....$349
CDR/H17 adaptor cable .....$ 20

CPC CP/M ⇐⇒ PCDOS

Transfer files between PCDOS and CP/M disks. Includes access to subdirectories. For H89 or H8 with soft sector controller.

CPC — specify controller.....$35

ZCPR3 for H89 and H8

We are licensed by ECHELON to distribute the Z-System. Includes ZCPR3 system, ZRDOS+, supporting utilities, ZCPR3 manual by R Conn, ZRDOS manual and additional instructions. Comes installed with a bootable disk ready to run.

Z-System — specify format and hardware $98

TURBO MODULA 2

Borland/Echelon Turbo Modula 2 software for CP/M.

Turbo Modula 2 — specify disk format $65

TURBO PASCAL

Popular Pascal from Borland International.

Turbo Pascal 3.0 .....$59
Turbo Toolbox.....$45
Specify CP/M or MSDOS and disk format

C/80 Compiler

The C Compiler from *The Software Toolworks.*

C/80 Compiler $45
C/80 Mathpak $27
Specify CP/M or MSDOS and disk format

THE SMART CHECKBOOK

A personal finance program by Softquest. Has power to meet sophisticated financial needs. Easy to use, even for the novice.

Smart Checkbook $89
Specify CP/M or MSDOS and disk format

SUPERSORT

Powerful sorting program originally sold by MicroPro.

Supersort.....$119
Specify CP/M or MSDOS and disk format

STANDBY POWER

Uninterruptable power supplies with **sine wave** output. Call or write for a brochure on these supplies.

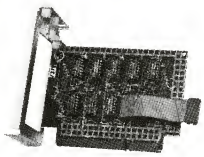
UPS200 200watt.....$339
UPS300 300watt.....$479

DISKETTES

High quality diskettes at an economy price.

5" DSDD 10 hard sector .....$16/box of 10
5" DSDD soft sector.....$12/box of 10

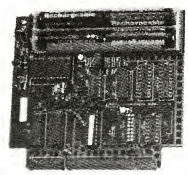
HEATH/ZENITH 88, 89, 90 PERIPHERALS

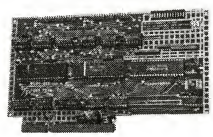


16K RAM EXPANSION CARD

Only $65.00
Shipping & Handling $5.00

REAL TIME CLOCK
Price $130.00 with Batteries
Shipping & Handling $5.00
$114.00 without Batteries





2 PORT SERIAL
3 PORT PARALLEL
I / O CARD

Price $199.00
Second Operating System Driver $25.00
Shipping & Handling $10.00

Seccrg Computer Systems

PRICES ARE LESS SHIPPING & TAX IF RESIDENT OF CALIFORNIA.

MAIL ORDER: 12011 ACLARE STREET, CERRITOS, CA 90701
(213) 924-6741

TECHNICAL INFO / HELP:
8575 KNOTT AVENUE, SUITE D
BUENA PARK, CA 90620
(714) 952-3930

TERMS & SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE
VISA & MASTER CARD GLADLY ACCEPTED

Circle #157 on Reader Service Card

FBE Cards For H/Z-89 Computers

SPOOLDISK™89 Electronic Disk & Printer Interface/Spooler–Microprocessor-based card with 128K of RAM acts like fast, quiet disk and also runs printer via Centronics Parallel interface (RS-232 available). Use for normal system printing or for spooled automatic printing. Installs on right-side bus. CP/M® and HDOS software included. ***RS232 $15***
SPOOLDISK™89 $195
Parallel Printer Cable $24

SLOT4 BUS EXTENDER–Adds fourth card slot to right-side bus. Easy installation with no permanent modifications. ***SLOT4 $47.50***

H89PIP PARALLEL INTERFACE–Two ports using 8255 PPI chip. One port bare and one port buffered for use as Centronics Parallel printer interface. Installs on left or right-side bus. CP/M® and HDOS printer driver software included. ***H89PIP $50***
Parallel Printer Cable $24

FBE

FBE Research Company, Inc.
P. O. Box 68234
Seattle, WA 98168
(206) 246-9815

CP/M is a trademark of Digital Research Inc.
VISA and MasterCard Accepted.

Circle #116 on Reader Service Card

level. (Even at 1200 baud, we're talking about nearly two hours of connect time for the uncompressed file.)

Even though I recognize the problems they face, I have to say that the attitude of the HUG BBS seems to be one of collective apathy. Once a few of us have HDOS 3 in our hands, it will be imperative that we make sure that it's made available to others who can use it. Along that line, the system operator of the GEnie CP/M RoundTable has agreed to distribute HDOS 3 on GEnie. I should have it uploaded before this reaches you.

96-t.p.i. disk drives—update

Due to my own lack of hands-on experience with 96-t.p.i. disk drives, I may have given the wrong impression in my last column. I implied that using 96-t.p.i. drives in your system could limit your ability to deal with software in the 48-t.p.i. format.

I recently borrowed a 96-t.p.i. drive with which to experiment. After incorporating it into my system, I was able to verify its ability to successfully read and write to a brand-new diskette formatted at 48 t.p.i. However, it cannot write to a disk previously formatted at 48 t.p.i. Both HDOS and CP/M give me an error message when I try.

Additional problems could arise if a 48-t.p.i. disk has been written to by *both* 48- and 96-t.p.i. drives. The heads on a 48-t.p.i. are wider than those on a 96-t.p.i. drive. So when a 48-t.p.i. drive reads a track, it might read both the data written by a 96-t.p.i. drive *and* parts of a track left over from an earlier 48-t.p.i. write.

If you keep this problem in mind, however, you should be able to feel secure knowing that you will be able to deal with both formats if you purchase a 96-t.p.i. drive. You would do well, though, to keep at least one 48-t.p.i. drive around in case you need to create a disk in that format.

This brings to mind something special about the Heath/Zenith eight-bit computer line. Designed primarily as hobbyist systems, the H/Z computers incorporate a great deal more flexibility than you find in other brands. Whenever they move up to a newer capability, Heath/Zenith tries to make sure that their computers can handle both the old and the new. So, a 96-t.p.i. drive can read disks from a 48-t.p.i. drive. Also, a double-sided drive can read disks from a single-sided drive.

Alternative boot and FORMAT options

While we're on the subject of switching between different kinds of drives, it might be good to remember that there are several boot options available to the H89 user. Under normal circumstances, entering a B (for Boot) and a <RETURN> after a power-up or reset will cause the unit to boot from drive unit zero; that is, A: under CP/M or SY0: under HDOS.

Sometimes we can fall into the habit of assuming that the A: or SY0: drive is our only alternative. However, say you have a multi-drive system, and your A: drive is having problems. Does this mean your whole system is down?

Nope, just enter B1 or B2 and a <RETURN>; the computer will boot from drive unit one (B: or SY1:) or drive unit two (C: or SY2:).

Or maybe you're running both hard- and soft-sectored controllers at the same time, and the controller from which you normally boot fails. Entering BSD and <RETURN> will cause the unit to boot from the drive-zero unit of the other controller. (The SD stands for "Secondary Device.") The same drive-number conventions still apply, so BSD2 would boot from drive unit two of the secondary device controller.

(Since the computer automatically completes the word BOOT when you type B after a power-up or reset, any numbers or characters typed afterwards would appear immediately following the word BOOT. For example, typing BSD1 would cause BOOTSD1 to be displayed on the screen.)

This same flexibility carries over into the FORMAT and INIT programs, which can allow one drive to format a disk in several different formats.

And while we're on the subject of disk formatting, although it's been covered many times elsewhere, CP/M's undocumented extended-density option bears repeating in case you missed it. Say you're formatting a disk with the Z37 soft-sector controller and CP/M. At one point, the FORMAT program will ask you to select "S" for single-density or "D" for double-density formatting. At that point, although it's not mentioned, you may also select "E" for extended-density formatting.

Extended density will increase the storage capacity of a double-sided 48-t.p.i. disk to 360K. Although Heath chose not to support this feature in its documentation, I have found no ill effects after several years of regular use of extended density.

Disk cataloging

At one time or another, we all realize that our disk collections are getting out of hand. Disks are stacked everywhere, notes are separated from the disks, and the labels have been scratched out and re-written so many times that they've become illegible. Sure, you can always keep an organized notebook—but wasn't record-keeping one of those things you bought the computer for in the first place?

Let's take a look at one of the best public domain disk-cataloging programs for CP/M, the MCAT/XCAT series. The versions I'm using are Harold F. Bower's MCAT505 and XCAT502. These are both outgrowths of earlier versions by Irving Hoff. (They are available on GEnie and

other bulletin boards, but I don't know of any mail-order source.)

To set up a cataloging system using MCAT, you must first assign a name to each one of your diskettes. The best thing to do is to create a file name using a hyphen as the first character, and a three-digit code as the extension.

For example, if you have several disks of games, your third disk might be called -GAMES.003. Now, using CP/M's SAVE command, you can create a file of zero length on your disk by entering SAVE 0 -GAMES.003. Typing DIR to display the directory should now show -GAMES.003 as a file.

Why start the file name with a hyphen, you ask? Most sorted-directory programs, as well as MCAT, will display the files on a disk in alphabetical order. Referring to a chart of ASCII values, you will see that the hyphen precedes any of the alphabetic characters. Therefore, when the files are displayed, your disk title entry will always show up first, serving as a header.

Create a title entry for each of your disks. Be sure each disk has a unique name since duplications will cause problems later.

We are now ready to run MCAT. You need to select a disk to hold MAST.CAT, the catalog file created by MCAT. MAST.CAT will contain the file names of every file on every one of your disks.

MCAT will let you specify particular file names to be ignored in the cataloging process. This is useful to prevent needless redundancy of files that appear frequently on your disks. For example, I will usually suppress cataloging of the file BIOS.SYS, which appears on every bootable disk.

MCAT will prompt you to insert your disks one at a time. If a file entry for the disk name has not been created, you will be prompted to create one now. For each disk, MCAT will read the file directory, sort it, and include it in the MAST.CAT file.

After you have processed all your disks, MAST.CAT will contain a listing of all the files on all your disks in one large file. Now this information is great to have, but it would sure help if there were some way we could access it usefully.

Here's where the other half of the pair, XCAT, comes in handy. XCAT gives you the ability to cross-index and list the contents of the MAST.CAT file, and gives you a wide variety of options for formatting the output.

With XCAT you have the option of sending output to the terminal screen, to the printer, or to another disk file. You can sort by file name, extension, disk number, or any combination of these.

The command-line variations are many; for example,

```
XCAT *.BAS -P
```

would send a listing of all BASIC files to the printer.

With MCAT and XCAT, you never need to fumble for that lost program again. Next time, I'll compare these programs to The Organizer, a similar commercial offering from McNeal Audio. I'll also look at CLIST, a cataloging program for HDOS from the HUG library.

Bits and pieces

Issue number 128 of *Buss* contained a total of 25 entries. Of these, twelve contained information pertaining to CP/M, HDOS, and/or the H8/H89 eight-bit computers. Who says nobody ever writes about these machines anymore?

Is anyone out there aware of a good copy utility that will transfer files between CP/M- and HDOS-formatted diskettes using the Z37 soft-sector controller?

Does anyone know how to unprotect a protected Microsoft BASIC program under HDOS? I've got a few I'd love to pick apart and compile with BASCOM, and I'm sure some of you do, too.

As usual, you can reach me at the following addresses. Electronic mail gets answered first; for a reply through U.S. mail, be sure to include a self-addressed stamped envelope.

Walter J. Janowski
1505 East Evans Avenue
Valparaiso, IN 46383
CompuServe: 72376,1652
GEnie: WJJANOWSKI

Ordering Information

HDOS Version 3, $25.
Bill Parrott
7010 Caenen Avenue
Shawnee, KS 66216 △

HOME FINANCE SYSTEM VERSION 2

—An extensive Home Finance System that keeps track of checking, asset accounts (cash, savings, IRAs, CDs), and regular bill payments. Let your printer write your checks for you on **any** business-sized check (design your own check format).
—Checks have user defined codes and a separate flag for tax deductible items.
—Many reports, including listing all checks, or checks by codes or tax flag.
—System consists of 130 page users manual with 5 program disks (5-¼") and a sample data disk.

Hardware: H8/HZ89 (64K) or HZ100 with 2 disk drives. Any Heath®, Zenith® or other printer.
Software: CP/M or CP/M-85/86 (Ver. 2.2) and MBASIC 5.21 for CP/M.
Order: Complete System $89† (specify hard or soft sector 5¼", HZ89 or HZ100). Manual alone $21.†
MasterCard/Visa accepted, please include your phone number.
†Prices include shipping.

Jay H. Gold, M.D.
Jay Gold Software
Box 2024, Des Moines, IA 50310
(515) 279-9821

Circle #120 on Reader Service Card

H89 20-MEGABYTE WINCHESTER, Only $595
TIRED of swapping floppies and living with limited space?
- Boot from one 20-meg or two logical 10-meg drives
- Seagate ST225 drive and controller can be used in H/Z150-160
- External option, $125; parallel-printer port, $10
- Drive and controller for H/Z150-160, $400

H89 & H/Z150-160 SPEED DOUBLER, $34.95
STOP WAITING! Increase your computer's speed NOW! Easily installed. NO trace cuts or permanent mods.

H89
- Software-select 2- or 4-MHz
- Supports Heath, Magnolia, CDR CP/M, and HDOS
- 4-MHz Z80A included
- Complete kit with s/w.....**$24.95**

H/Z150-160
- Runs at 6.67 or 4.77 MHz
- 2.5 Norton Index with V20
- FREE hardware reset
- Satisfaction guaranteed!
- Complete kit.....**$24.95**

EXPANDED MEMORY FOR H/Z150-160
Super PAL—1.2 meg of memory. Disk driver and LIM expanded memory driver included.....**$49.95**
MT PAL—640K or 704K bytes on single memory card.....**$19.95**

SOFTWARE FOR ALL HEATH/ZENITH COMPUTERS
Perfect Printer, Perfect Money, or MT Accountant, $19.95
Perfect Funds, $29.95 Paycheck, $39.95

ORDER NOW by writing or calling: Micronics Technology
(904) 897-4257 449 Barbados Way, Niceville, FL 32578
Checks, Visa, MasterCard accepted. Florida residents add 5%.
Shipping and handling: $2 Winchesters: $15

Circle #207 on Reader Service Card

IBM Emulation With HUG's ZPC

They said IBM emulation for the Z100 couldn't be done with software alone. That didn't stop Pat Swayne from doing it.

Wayne Rash, Jr.

This is the third in a series of reviews of products that allow the H/Z100 to run software intended for the IBM Personal Computer. In the previous two articles, I covered the Gemini emulator board from Gemini Technology and the EasyPC board from UCI Corporation. (See "IBM Emulation with the Gemini Board," in *Sextant* #24, September-October 1986; and "IBM Emulation with the UCI EasyPC," in *Sextant* #25, November-December 1986.)

Both of those products are hardware packages—although they reflect quite different strategies in pursuing compatibility. (See "IBM PC Emulation Strategy," accompanying this article.)

Unlike the Gemini and UCI products, ZPC from the Heath/Zenith Users' Group uses software to make the Z100 compatible with the IBM PC. In this, HUG and ZPC's author, Pat Swayne (HUG's software engineer), have gone against conventional wisdom. Before ZPC, the assumption was that emulation could be provided only by hardware, by something almost on the order of another computer inside your Z100.

Interestingly, however, the first attempt at IBM emulation in the Z100 was made in software. Back in 1983, Graham Wideman of Wideman Computer Consulting offered his IBEm program, which allowed the Z100 to run a number of IBM packages.

Wideman, however, ran up against one fundamental problem: too many programmers wrote hardware-specific code into their IBM programs in order to circumvent the Microsoft Disk Operating System (MS-DOS). If they wanted their programs to provide sophisticated graphics, they had to circumvent MS-DOS because it provided no support for dot-addressability. And they also circumvented it in order to gain more speed.

Wideman described his efforts in "Why Won't All That IBM Software Run on My Z100?" in *Sextant* #9, March-April 1984. (There, he also raised the possibility of using additional hardware. Afterward, though, he felt that it would be too expensive.)

The software alternative, however, has always been intriguing. It's a solution that is easy to implement, and one that is not invasive of your computer. As well, it's inexpensive: ZPC costs just $60. (Add HUG's annual membership fee of $20 if you're not already a member.)

Doing it entirely in software is a significant accomplishment.

On the other hand, Pat Swayne and ZPC face the same situation that Graham Wideman faced; there are many compromises in ZPC, and not all IBM-PC software will work properly with it.

Still, the fact that it has limitations is not a good reason to downplay the importance of ZPC. If running a wide range of IBM software on the Z100 had been easy, it would have been done a long time ago. Doing it entirely in software is a significant accomplishment.

A look at ZPC

There are no chips to install or boards to plug in with ZPC. To make your Z100 compatible with the IBM, all you get is a disk and a manual. On the disk are two versions of the program: one for machines with a full 768 kilobytes of random-access memory (RAM), and another for machines with less memory. Running the version for full memory gives you the ability to emulate IBM graphics. Otherwise, the emulation is for a monochrome IBM PC.

There are several other items on the disk, along with the two versions of ZPC. There is a program to turn on the IBM-PC emulation (called PC), and another to turn it off (called Z100). ZPC is the only emulator that allows itself to be turned on and off without re-booting.

There is also a version of the ANSI console driver called ANSISYS. Unfortunately, it works only in the IBM mode, and not all IBM software will recognize its existence. Some of the Norton Utilities had this problem, for example.

Contrary to the practices of commercial software developers, HUG has included the source code for ZPC. The entire system is written in assembler, so you'll need some experience with the Z100 and with 8086 assembler before you'll be able to do any modifications. By studying the source code, though, even relatively inexperienced users should gain some understanding of ZPC's operations.

Using ZPC

You load ZPC into your Z100 just as you would run any other piece of software. That is, you call it from a disk, it signs on, and it loads itself into memory. But it doesn't *appear* to do anything—you're still in ordinary Z100 mode. Your Z100's MS-DOS prompt returns, and your machine acts as it always has. You actually invoke ZPC's IBM emulation by calling its PC program; until then, nothing else happens.

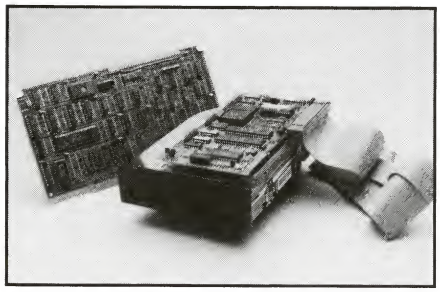
When you run PC, you'll see a dramatic change. The screen clears, the MS-DOS prompt changes to look like the one on an IBM PC, and the letters on the screen look like the IBM character set. You're all set to run IBM-PC software—provided, of course, that your software will run with ZPC.

Whenever you finish running your

Wayne Rash, Jr., is a microcomputer consultant with American Management Systems, Inc., in Arlington, Virginia. He writes frequently for Sextant, Byte, PC World, *and other computer publications.*

NEW PRODUCT ANNOUNCEMENT

UCI Mini Catalog:



EasyWIN

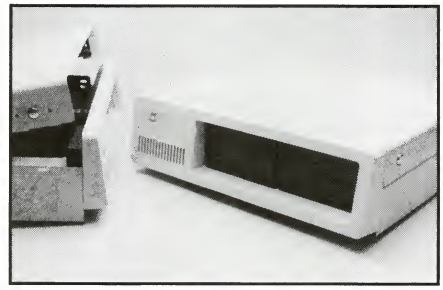
Most economical hard disk system available for the Z-100. It replaces the Z-217 hard disk system and works just like it. You can prep it, part it, and boot from it.

Features:

▪ Direct replacement of Zenith Z-217 Winchester disk. ▪ Controls 2 physical drives. ▪ Supports auto boot, all Z-100 formats, and Zenith diagnostics. ▪ Operates in any Z-100 with or without EasyPC. ▪ Future support of other hard disk controllers, removable cartridge drives, etc. ▪ Operates at 5 or 8 MHz.

Includes:

▪ Intelligent controller card to adapt IBM PC compatible hard disk controller to the Z-100. ▪ Western Digital PC hard disk controller card. ▪ Seagate 10/20/30 MB hard disk drive (ST215/225/238). ▪ Drive cables. ▪ Fully documented User's Manual.



Z-148 Expansion Chassis

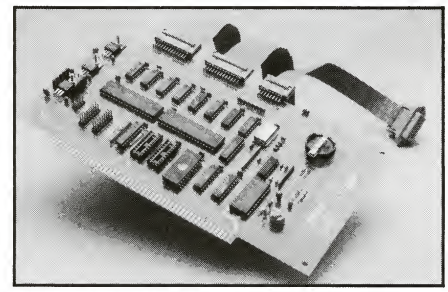
Finally a way for Z-148 users to take advantage of the growing world of IBM PC hardware including EGA, PGA, modems, hard disk drives, multifunction cards, etc.

Features:

▪ 8 available slots: 6 full PC slots and 2 half-size slots. ▪ 135 watt switching power supply with built-in fan. ▪ UL and FCC approved chassis and power supply. ▪ 5 or 8 MHz no wait state. ▪ Standard internal mounting brackets for 2 full-height or 4 half-height drives. ▪ Easy access, flip top metal case.

Includes:

▪ Z-148 adapter. ▪ 5 ft. shielded cable. ▪ Fully documented Installation Manual. ▪ Dimensions: 17.5″ D × 19.5″ W × 5.5″ H. ▪ Weight: 25 lbs. ▪ Color: Ivory.



I/O Plus

The least expensive way to obtain respectable but limited PC compatibility in a Z-100. Will run many, but not all, popular PC programs. Some copy protected programs may present problems unless patched.

Features:

▪ ZPC™ program and hardware circuit. ▪ ZPC program on EPROM (optional). ▪ One game port (2 joy sticks). ▪ Up to 115k baud rate. ▪ 2 IBM 8250 serial ports. ▪ Clock calendar with battery back-up. ▪ Fully documented User's Manual.

ZPC is a trademark of Heath Users Group. IBM & IBM PC are trademarks of IBM Corporation. Z-100, Z-148 & Z-217 are trademarks of Zenith Data Systems.

Call now for your copy of the Fall '86 Edition of the UCI Product Catalog.

800-UCI-COMPUTER

UCI CORPORATION

948 Cherry Street, Kent, Ohio 44240
(216) 673-5155 / 800-UCI-COMPUTER

Circle #196 on Reader Service Card

IBM PC Emulation Strategy

It is possible to make a Z100 behave like an IBM Personal Computer. It's even possible to make it happen fairly effectively. There are three products that I have reviewed in *Sextant*, and they each take a different approach to solving this problem.

Briefly, the approaches can be described as hardware-only, hardware/software, and software-only. These are loose descriptions, but they will do to set the methods apart. You should note that nothing in these descriptions is absolute. The hardware approach does require some software, and the software approach can use some additional hardware to good advantage.

The UCI EasyPC board is the most hardware-oriented product. Essentially, it is like putting an IBM-PC clone inside your Z100, and using the peripherals for support. This is why the product consists of three circuit boards and a wiring harness. Because all of the work is done by hardware, the UCI method produces the fastest machine, and the most effective screen handling.

The Gemini emulator board makes very heavy use of ROM-based software, and it has its own CPU just to handle the emulation. This results in much less hardware being used, easier installation, lower cost, and probably more effective emulation. The use of software for much of the emulation does result in slower operation, but it also means that problems can be corrected sooner. As Motorola's Bill Lucas once said, "Nobody's ever come up with an editor for hardware."

The Heath Users' Group's ZPC takes the software-only approach. As with the Gemini board, this makes it easy to update, but there are limits to what software alone can accomplish. In this case, the result is less effective emulation, which means that you may have to patch some software so that it will run with ZPC. The addition of some hardware to the Z100 will help this system. The software-only approach does have an advantage in flexibility, since it is simply a program which is called as needed.

IBM software, you can return to the Z100 mode. You do this by simply running ZPC's other program, Z100. Again, this is the only emulator that allows you to shift freely between the two modes of operation. The others require you to reboot your computer each time.

While running in the PC mode, your '100 will act much like an IBM PC or a clone. The greatest difference you're likely to notice is slightly slower operation. I understand that this can be fixed by using a 5-megahertz NEC V-20 as a replacement for the Z100's stock 8088 central processing unit (CPU). Obviously, if you speed your machine up to 8 MHz, you'll run even faster than an IBM PC.

(But be careful about the V-20 if you run CP/M software on the Z100's eight-bit CPU, the 8085. CP/M-85 on the Z100 uses the 8088 CPU as well as the 8085. I have an *8-MHz* V-20, and it runs my CP/M software with no problems. Reportedly, however, the *5-MHz* V-20 won't run CP/M on the '100. Make sure you get an 8-MHz V-20.)

Compatibility

Software can do only so much. There are some areas of IBM compatibility that are beyond ZPC's capability. Some of those areas, however, can be taken care of with the addition of a little hardware. Basically, the problems ZPC has are related to copy protection, screen handling, and some hardware differences between the Z100 and IBM-compatible machines.

The most common culprit, however, is difficulty with screen handling.

For example, the Z100 will not display high-intensity white with ZPC. Instead, the display uses an underscore to indicate intense white. Intense colors are emulated by mixing white with the colors, which results in pastel colors.

Next, many IBM programs write directly to a video port that does not exist in the Z100. As a result, these programs will not run under ZPC unless you patch them to write to a Z100 video port. The ZPC disk includes an automated patcher that will work with many popular programs. Others will have to be patched using DEBUG or some other program capable of editing executable code.

Copy protection is also a problem for ZPC. While the more hardware-oriented solutions to IBM compatibility can handle copy protection, ZPC cannot always do this. As a result, you will have to find an IBM PC, and use it along with a protection-removal program to create a copy of the software without copy protection. Only then can the program be patched and used on the Z100. A few copy-protected programs, including Lotus 1-2-3 version 1A, will work after having had the copy protection removed. Fortunately, copy protection is slowly being abandoned by software manufacturers.

(Information both on ZPC itself and on the peculiar problems of a number of popular programs is available from HUG. ZPC was first described in "HUG New Products" in the September 1985 issue of *REMark*, and Swayne has followed that up with a series of articles discussing the program. "ZPC Update" #1 appeared in the November 1985 issue of *REMark*, and updates have continued quite regularly since then. Version 2 of ZPC was introduced in the May 1986 issue.)

Finally, there are other hardware differences. The Z100 uses a different serial-output chip than does the IBM. Because of this, software that directly addresses the serial ports will not work with ZPC. This means that you cannot use most modem-communications software, as well as devices such as mice. Normally, serial printers will work, however, since they use MS-DOS to access the printer ports.

The Z100 keyboard is also different from that on the IBM PC. It is at a different address, its layout is different, and it produces different signals. As with screen problems, these differences may require that the program you're using be patched to work properly.

Which programs will run?

What does all this mean to you? Briefly, very few programs will run properly right out of the box. Almost everything needs to have the copy protection removed, or will need to be patched. In addition, anything requiring graphics will also require 768K of RAM.

A few commercial packages will operate, as will software written using Turbo Pascal or the Zenith version of the GW-BASIC compiler. I was able to use one version of WordStar and dBASE II without problems. However, both of these programs can be configured to run on the Z100 without any emulation. The ZPC manual lists several packages that will run properly, including Microsoft Word, Benchmark, and PC File. Several other packages will work if you use ZPC in its monochrome video mode.

You cannot count on every version of a program working. Early versions of Ashton-Tate's Framework and dBASE III will not work properly, although later versions will work. You should understand that your chances of receiving help from the software manufacturer are quite slim when they find out that you're running a patched version of their software on a Z100.

Patching

Fortunately, HUG has included a series of utilities on the distribution disk that automate the patching process for a few of the more popular packages. To use these utilities, you run the program called PATCHER and tell it which disk drive to use. PATCHER will then display a menu of programs you can have it patch; then it will insert the necessary changes.

You can sometimes avoid patching if you use the monochrome video mode of ZPC. In this mode, your Z100 is set up to emulate the monochrome video adapter on an IBM PC. You won't be able to use graphics in this mode, but many packages use no graphics at all.

Installing ZPC

Once you have your Z100 configured with enough memory, installation requires that you make a duplicate of the distribution disk; then you can run SETZPC, if you wish. This program will let you configure the default settings of ZPC for such things as whether you'll be running color or monochrome, how ZPC emulates certain colors, etc.

The manual

When he produced this manual, Swayne obviously intended to uphold the tradition at Heath for excellent documentation. Despite the fact that it is only 27 pages long, the manual is complete and easy to read. ZPC is described in detail in both its operation and its effect on software that is used with it. In addition, the program's strengths and limitations are spelled out clearly.

Advanced users will find that the appendices are well used to present the technical details of ZPC's operation and its interaction with the machine. Here you will find explanations of memory usage, patching, and advanced capabilities.

Should you buy it?

One of the significant strong points of ZPC is its low cost. As mentioned, this package costs only $60; so, even if it doesn't do all that you'd hoped, you haven't invested all that much. In addition, the low price makes the prospect of having to buy additional software and hardware more palatable.

Much popular software will run with ZPC. You might have to patch it, and you might have to remove the copy protection, but it will run. Unfortunately, those programs that adapt most easily to ZPC are also likely to have a Z100 version already in existence. These packages include Lotus 1-2-3, Microsoft Word, dBASE II and dBASE III, Multiplan, and WordStar. If the software you intend to use is supported by ZPC, then you may well consider it worth the investment.

Conclusions

If you need to run on your Z100 an occasional piece of software that was originally written for the IBM PC, ZPC is a good solution. You have to go through the process of loading the emulator, and then running the program, and you have to give up sound and input/output redirection. For occasional use, though, that shouldn't be a problem.

Problems may arise when you have to use *many* IBM programs. Then you might as well buy an IBM-compatible computer. You will at least know that the software will run properly.

ZPC is an exceptional feat by HUG. Until it was introduced, conventional wisdom held that the Z100 could act like an IBM PC only with massive infusions of hardware. This turned out not to be the case, and ZPC shows how it can be done.

Ordering Information

ZPC, $60.
Annual HUG membership, $20 in U.S.; $35 to APO/FPO and foreign addresses.
Heath/Zenith Users' Group
Hilltop Road
St. Joseph, MI
616/982-3463 △

Hardware, Too?

Many of the problems that ZPC has with screen-handling can be solved by a circuit board that you can add to your Z100. In *REMark*, Pat Swayne described building one such board—called ZHS—from scratch. (See "Hardware Patch" in the April 1986 issue of *REMark*.)

Some of you may find such a project a bit challenging. If so, you might want to investigate commercial alternatives. I have not been able to try any, but one board is offered by Scottie Systems (2667 Cropley Avenue, #123, San Jose, California 95132, 408/259-6226.) Their assembled and tested Scottie Board costs $129, and is advertised to comply with ZHS specifications. (The package includes HUG's ZPC in the $129, and options such as a clock are available at additional cost.)

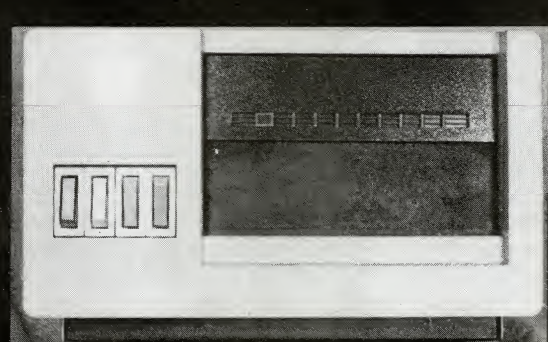
Also, UCI Corporation (948 Cherry Street, Kent, OH 44240, 216/673-5155; 800/UCI-COMP), makers of the EasyPC board, are reportedly about to offer a ZPC-support board.

As another consideration, Swayne's ZHS board uses one of the S-100 expansion slots; alternative designs might not. Whatever the details of the board's design, however, ZPC uses it to perform some of the functions that it can't perform in software. The board also eliminates the need to patch some programs.

If you're interested in ZPC, then, it might well be worth your while to investigate building Swayne's ZHS board or purchasing a comparable unit.

BEA-SOFT COMPUTERS
BOX 319
SHALIMAR, FL. 32579
(904)651-9231

EXPANSION AND HARD DISK CASE



4 LIGHTED SWITCHES

1 FOR CASE
AND OTHER SWITCHES

3 FOR COMPUTER
PRINTER ETC.

3 HALF HEIGHT
OR
1 FULL HEIGHT
+ HALF HEIGHT
DRIVES

65 WATT PS
EMI AND SURGE
SUPPRESSION

CIRCUIT
BREAKER

VISA
AND
MASTER CARD ONLY $120.

3 PHYSICAL IBM FULL LENGTH SLOTS (NO ELECTRONICS)
(DRIVE NOT INCLUDED) ST 225 HARD DISK $310

Circle #150 on Reader Service Card

QUIKDATA, INC.

1977 ONE DECADE OF SERVICE 1987

TO THE HEATH/ZENITH COMPUTER WORLD

That's right! We've been here for **10 YEARS** serving the Heath/Zenith computer world. We started with the H8, and have continued on through the H89/90, H/Z100 series, the H/Z PC computers, PC laptops, and the Z240 -AT series.

If you're a newcomer, you may not have heard of Quikdata. This is our first advertisement in almost two years. We depend mainly on word of mouth to spread our business, because that's the best advertising you can get - it also helps us keep our prices to a rock bottom low, while providing you with full service and support. We felt it was time to get our name out again for those of you who may have the misfortune of not knowing of **the mail order service who cares!**

What made us a leader in supplying H/Z users in the past 10 years? * Lowest Prices * 24 hour shipping on 99% of all orders * We are familiar with the products we sell * Most every item sold is used in-house * We stand behind everything we sell * Software and hardware consultation * Systems put together the way you want * On-site repair facilities * We **stock** what is in our catalog * Support the H/Z line of computers * We treat you as an individual * Full stock of repair and replacement parts * H-SCOOP newsletter to help you get the most from your system

MEMORY AND STORAGE DEVICES

M41256 150ns 256K DRAM CHIPS	$2.79
M41256F 120ns 256k CHIPS	$2.95
M41256T 100ns 256K CHIPS	$3.49

Z150W20 21 MEG WINCHESTER FOR PC'S. This unit includes Segate ST-225 21 meg half-height winchester drive, OMTI controller, cables, software, mounting hardware where applicable. Complete kit with PREPped winchester ready to install and go.
Z150W20 $419

Z150MP memory mapping PAL for use in H/Z150/160 systems to allow up to 704K of system RAM on main memory board. Requires 18 M41256 memory chips plus up to three banks (27) of the 64K M4164 chips. $19

MEGARAM-150 for the H/Z160 computers allows up to 704K system memory and 512K RAM drive memory. Software included. Uses up to 5 banks (45) of the M41256 memory chips.
MEGARAM $43

BARE WINCHESTER DRIVES

ST-225 half height 21 meg 80ms	$319
ST-4026 full voice coil 21meg 37ms	$595
ST-4038 full voice coil 32meg 37ms	$639
ST-4051 full voice coil 40meg 37ms	$749

FLOPPY DRIVES

SA-455 half-ht DS DD 360K	$129
TM100-2 Tandon full DS DD 360K	$129
SIEM-R SS Siemens refurbs	$ 59
TM100-4R Tandon DS DD 96TPI refurb	$ 95
M4853 Mitsubishi half-ht 96 TPI	$139

COMPUTERS

We carry the full line of Zenith computers, but the prices are too low to list here! If you are interested in a system, call or write for a complete system quote. Tell us what you want in the system and we'll be glad to quote you a price. To the basic systems we can add additional memory, drives, winchesters, whatever you need. All systems come with MS-DOS 3.x operating system.

H8/H89 STUFF

H37 SOFT SECTOR CONTROLLER BOARD	$195
WH8-37 H8 SOFT SECTOR CONTROLLER	$295
VIDEO BLANKER	$ 21
AUTO REPEAT (kit $33), assembled	$ 43
16K H89 MEMORY EXPANSION BOARD	$ 49
AS-IS H89 CPU & TLB BOARDS	$ 39
REFURB WORKING H89 CPU/TLB BOARDS	$ 79

21 MEG WINCHESTER SUBSYSTEM (requires HDOS/CP/M software package for $95 and host adapter card. H8 uses WH8-37 and H89 can use Z67 or ADD320).

H20	$649
ADD320 SASI winchester/3 serial ports	$145

We also have keyboards, H89 power supplies and parts, transformers, video boards, cables, H17 disk controllers, serial I/O boards, memory chips, diskettes, various H8 boards and much much more.

PANASONIC PRINTERS

KXP-1081i 80 column 120 cps F/T parallel	$259
KXP-1092 80 column 180cps F/T parallel	$395
KXP-1592 132 column 180cps F/T parallel	$495
KXP-3151 daisy Diablo 630 compatible	$469

DISKETTES

3740/2D	8" DS DD SOFT	$29
3740/1	8" SS SD SOFT	$25
204/2D	5" DT DS DD SOFT	$37
207/2D	5" DT DS DD HARD	$37
104/2D	5" ST DS DD SOFT	$25
107/2D	5" ST DS DD HARD	$28
5H-11 Sentinel	5" ST SS SD 10-HOLE HARD	$19
BROWN	UHR for -AT's	$37
UHRII	Dysan UHR for AT's	$47
X35	Xidex/Dysan ds 3 1/2"	$22
352D	Dysan high end 3 1/2"	$35

We carry a full line of modems, disk drive and winchester drive cabinets and cables, software, hardware, surge and spike suppressors, line conditioners, backup power supplies, serial printer interfaces, print buffers, and more.

Call or write for a **free no obligation catalog** of our product line and/or a sample issue of our H-SCOOP H/Z newsletter. VISA and MC accepted. All prices are CASH prices - PO's add 5% and pick up 3% S&H. Charge cards pick up 3% S&H. Cash orders over $100 shipping on us. All orders under $100 pay $4 S&H.

QUIKDATA, INC.

2618 Penn Cir
Sheboygan, WI 53081
(414) 452-4172

Circle #221 on Reader Service Card

YOU'VE GOT THE BEST!

NOW GET THE REST... H-SCOOP

If you're reading this advertisement, you probably own one or more Heath/Zenith microcomputers. The Heath/Zenith computers are the best buy in price/performance systems available. Now that you've got the best, get the rest. You need to keep up with the latest information as it applies to your H/Z system to help you **get the most from your system.** That's where **H-SCOOP** comes in.

H-SCOOP, the independent double density newsletter for H/Z computer support is probably the best asset you and your system can enjoy. You see, we've been supporting only H/Z systems since before Zenith was ever part of the whole scenario. In fact, we've been in the H/Z support business ever since the first H8's came rolling off the assembly line - 1977. That gives us one decade of first hand experience - more than anyone else! The first issue of the newsletter was mailed FIRST CLASS MAIL April 1980; it has continued each and every month like clockwork ever since.

Why **H-SCOOP**? Because **H-SCOOP** is the **only** H/Z related publication that **dares** to be different! Since we are not affiliated with Heath or Zenith, we **tell it like it is.** Keep in touch with the latest developments from Heath, Zenith and other independent vendors. The latest in hardware and software. The best prices. Know the vendors you can feel confident to deal with - and those to stay away from. Keep in touch with those having similar interests as yourself, and know who is doing what with their systems. Have a problem or need some advice? Use the REQUEST column. Want to sell or buy something? CLASSIFIEDS gets results. Reports. Reviews. Good guys & Bad guys - who are they? Who can you trust to deal with? Tips, ideas, problems, solutions - all part of **H-SCOOP**.

But let's be fair and let the subscribers speak. The following are unsolicited letters from some of our subscribers:

"As always, thanks for making this kind of information available. Your service is invaluable, not only for those of us overseas, but to anyone who wants to get the greatest service from his or her Heath/Zenith. Keep it up!" D. Shoemaker., APO NY.

"...Thanks very much for compiling and publishing such a useful, straightforward newsletter... I have certainly picked up enough information to repay the subscription price several times over." P. Herman, Canada.

"I would like to thank you for all that you do, it certainly is helpful to have someone like you in business that can provide our needs and at the same time give the necessary support. You certainly make my life better and easier thanks to your help. It is greatly appreciated." J. Waldron, Ohio.

"Your newsletter is refreshing and has been quite helpful to me as an owner of a Z-150 PC. I will continue to look forward to receiving it in the future." D. Howey, MD, Indiana.

"Please enter my subscription for your famous newsletter, H-SCOOP". C. Pitonza, New York.

"Enclosed is my renewal. My main difficulty with H-SCOOP is telling between very good, excellent and very excellent." A. French, LA.

"I'd like you to know how much I don't take what you do for granted. I very much appreciate your printing efforts..." E. Nitzke, MD, Iowa.

"Of all of the publications that I receive concerning computers I guess I enjoy yours most of all. First of all it's understandable, second, it tells it like it is..." Atty M. Aukerman, Indiana.

"As a satisfied customer of your products and subscriber of your newsletter I feel a word of appreciation and thanks is well overdue. I have experienced the degree of quality that keeps any human being content in being a member of the H/Z family. Thanks for your energy and sincere effort!" F. Scott, Maryland.

"Thank you for the wonderful and interesting reading in H-SCOOP for the past year. To say the least, it has been very enlightening and informative... Please keep up the outstanding work as all Heath/Zenith users can use your fine product." J. Minsterl, Virginia.

"I find the newsletter very informative and one of the best news letters for the Heath/Zenith user that I have seen." M. Stueber, Michigan.

"Because of an article you wrote some issues back, I was able to get my printer ... to come up in both HDOS and CP/M. Your advice on software and Good guys and Bad guys has been very helpful." L Becker, AL.

"The newsletter has made a steady improvement over the years. You contribute a lot to the usefulness of my computer and stop me from reinventing the wheel over and over again." T. Tverre, Norway.

"I have enjoyed the newsletter very much, especially because of your style of brevity and telling it like you see it. I get more out of one issue of your newsletter... than in the combined issues of ..." R. Tibbetts, CA.

"The newsletter, called H-SCOOP has enough gossip and opinionated evaluations to be worthwhile to anyone who uses an IBM PC or compatible. It is a must for Heath/Zenith users." John Dvorak, May 27, 1985 issue of InfoWorld

Seen enough? It's your move! Test ride it for a year. Rates: $24/year US and Canada, first class mail, $32 overseas AIRMAIL. Back issues available. **Special back issue deal:** Start the current year with the January '87 issue (expires with the December '87 issue) and receive all available back issues dated before January '87 for an additional $20 (US prices). VISA & MC accepted.

H-SCOOP

2618 Penn Cir
Sheboygan, WI 53081
(414) 452-4172

Circle #221 on Reader Service Card

C Notes

Joseph Katz

Interesting statistics

Any old '150 port in a storm

A sweetheart in every port

Zview notes

Interesting statistics

From time to time *Sextant*, like other well run magazines, surveys its readers to find out who they are and what they want. Analyses like these are employed when they're prospecting for advertisers.

The latest *Sextant* reader survey I've seen has two statistics that interest me, and might interest you, too.

One is that 16% of readers already own or use C. We're midway down the list, below those who own BASIC, Pascal, and FORTRAN, and above those who own Lisp, FORTH and COBOL.

The other interesting statistic is that 23% of readers plan to buy C programming tools within the relatively near future. C is at the top of the want list, substantially above Pascal (16%), FORTRAN (11%), BASIC (9%), COBOL (7%), FORTH (6%), and Lisp (5%).

For some unknown, odd reason, I usually find such statistics interesting. (I admit to finding these particular statistics much more interesting than if they had suggested that the only people who read this column were my brothers-in-law in Crystal Lake, Illinois, and West Hartford, Connecticut.) They confirm my sense that readers of "C Notes" are novice and intermediate C programmers, and they confirm my growing awareness that I ought to do more about showing you C products I find useful and telling you about those I don't.

I'll try.

Be sure I won't overlook shareware and public domain software: I love a bargain. But I'll also pay attention to professional-grade products and any specialized things I know or can learn how to use: I love fine tools.

If you've been following "C Notes" with due care and diligence, you know that I don't often confuse quality with price. I'll try to keep a good mix going, and do more with it.

Any old '150 port in a storm

From time to time, I've mentioned that C is the high-level language closest to the power and flexibility of assembly language. In other high-level languages, coping with machine-specific details can be quite a task; in C, it's a breeze.

Right now, the machine I'll be using as an example is the H/Z150. (We would be served equally as well by one of Heath/Zenith's other computers compatible with the IBM Personal Computer—or XT or AT.)

If you have a '150 or other IBM compatible, you have some interesting reading available. The 16 bytes starting at address 40:0000 in memory are nearly as exciting to read as a good thriller. They're the addresses for any serial and parallel ports installed on your computer.

Whenever you boot, portions of read-only memory (ROM) are loaded into random-access memory (RAM) to map the locations of programmable hardware in the computer. The 16 bytes in question are part of the basic input/output system (BIOS) stored in ROM.

If you have a stock Heath/Zenith IBM compatible, you might want to use DEBUG to dump this area of RAM. (The command in DEBUG is D 40:0000.) You'll then see what I've captured in Figure 1. With just a little instruction, it's pretty easy to read—even if you've never done so.

As we go through Figure 1, keep in mind that a DEBUG dump is divided into three columns of data, and each line represents 16 addresses in memory.

The left column gives the beginning address for each line; the leftmost four digits are the memory segment of the address; and the rightmost four digits are the offset—the number of bytes the address is displaced from the beginning of the memory segment. (The radix is hexadecimal, and a colon separates segment from offset in the address.)

The middle column gives 16 bytes in hexadecimal, representing the contents of memory. Each byte is separated from the next by a space.

Since the line starting at address 40:0000 itself contains addresses, you read the line in pairs of bytes called "words." There are eight words in that line. DEBUG displays them just as they're stored in RAM: inverted, with the "low-order byte" preceding the "high-order byte." So, "F8 03" displayed by DEBUG should be understood as "03 F8"—which is the port address for the serial port, COM1.

The far-right column in a DEBUG dump gives a representation of the hexadecimal values in the center, given in ordinary ASCII text. (Since *Sextant* likes me to be thorough about that sort of thing, I should point out that ASCII stands for American Standard Code for Information Interchange.) What you see is a mixture of alphanumerics and punctuation with no direct significance. Ignore this mess.

Concentrate instead on the first two columns: the bytes in the center and their addresses at the left.

DEBUG is terse: it provides only the

EVERYTHING THE C PROGRAMMER NEEDS

■ Eco-C88 C Compiler:

A full, professional C compiler with many ANSI enhancements at an unbelievably low price.

* Prototyping, enum, void data types, plus structure passing & assignment * All operators and data types * Over 200 library functions * cc and mini-make for easy use * 8087 support * ASM or OBJ output * Lint-like tiered error messages * Fast code * CED editor (edit-compile-link from within the editor) * Expanded user's manual * Not copy protected * All for only $59.95!

■ Eco-C88 Flexi-Graph Graphics Package

Everything you need to write dramatic graphics effects into your Eco-C88 C programs.

* EGA, CGA, and Z100 support * Over 100 graphics functions (many are PLOT-10 compatible) * Most assembler support routines are outside small model code-data * Write thru BIOS (for compatibility) or to memory (for speed) * Graphics function help from CED editor * World, pixel or turtle color graphics modes * 47 standard fill patterns, 17 line dashing patterns, Hershey fonts, plus user defineable fill, dash, and fonts * Supports view areas, rotateable fonts, clipping, arbitrary fill areas, extensive error checking, examples, and user's manual * Only $39.95

■ Eco-C88 Windowing Library

Use this library to build pop-up windows, help windows, selection menus, special effects—anywhere you need an attention getter.

* CGA and EGA support * Control any program that goes through the BIOS * Use up to 255 windows * No special window commands — use plain old printf( ) to write to a window * Resize and move windows * Custom window titles and borders * Can be used with ANSI device driver * Most window code-data are outside small model * User's manual and examples for only $29.95

■ Ecosoft Librarian

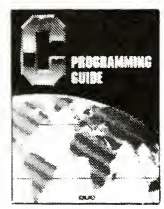
Combine your modules, functions, and subroutines into your own library for easy link commands. Compatible with any standard MSDOS OBJ files * Add, delete, and extract from a library * Get table of contents or index of a library * Combine libraries, control library page size, use switches for combinations, process complex library requests, use wildcards, and do library directives from command files * Complete with user's manual for only $29.95

■ Developer's Library

Contains the source code for for all library functions, including the transcedentals, memfiles, and those written in assembler. $25.00 with order, $50.00 if ordered later. (Sold only to Eco-C88 owners.)

Ecosoft Inc.
6413 N. College Ave.
Indianapolis, IN 46220

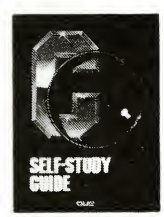
Eco-C88 C compiler requires an IBM PC, XT, or AT (or compatible) with 256K of memory, 2 disk drives and MSDOS 2.1 or later.



C Programming Guide

(Purdum, Que Corp.)

The second edition of the B. Dalton bestseller. Perfect for those just getting started with C. Includes discussion of many X3J11 ANSI Standards Committee recommendations. Many error messages from Eco-C88 give page references to this book. Price is $20.00 plus $2.00 shipping.



C Self-Study Guide

(Purdum, Que Corp.)

Using a question-answer approach, this book is filled with shortcuts, tips, techniques, and traps to avoid when learning C. Price is $17.00 plus $2.00 for shipping.

C Programmer's Library

(Purdum, Leslie, Stegemoller, Que Corp.)

Another B. Dalton bestseller. An intermediate C text for the programmer that wants to get the most from the language. Contains source code for many functions including an ISAM file handler. Price is $22.00 plus $2.00 for shipping.

To order, call or write:

1-800-952-0472 (for orders) or **1-317-255-6476** (tech. info.)

ORDER FORM CLIP & MAIL TO:
Ecosoft Inc., 6413 N. College Ave., Indianapolis, IN 46220

- ☐ Eco-C88 C Compiler $59.95 _____
- ☐ Eco-C88 Flexi-Graph Graphics Package $39.95 _____
- ☐ Eco-C88 Windowing Library $29.95 _____
- ☐ Ecosoft Librarian $29.95 _____
- ☐ Developer's Library $25.00 ($50.00 if not with order) _____
- ☐ C Programming Guide $20.00 _____
- ☐ C Self-Study Guide $17.00 _____
- ☐ C Programmer's Library $22.00 _____

SHIPPING $4.00
TOTAL (IND. RES. ADD 5% TAX) _____

PAYMENT: ☐ VISA ☐ MC ☐ AE ☐ CHECK
CARD# _____ EXPIR. DATE _____
NAME _____
ADDRESS _____
CITY _____ STATE _____
ZIP _____ PHONE _____

ECOSOFT

Circle #215 on Reader Service Card

Beginning Address	Contents of Memory	ASCII Representation
0040:0000	F8 03 00 00 00 00 00 00-78 03 00 00 00 00 00 00	........x.......
0040:0010	7D 42 00 00 02 C0 01 00-00 00 34 00 34 00 72 13	}B........4.4.r.
0040:0020	69 17 70 19 74 14 20 39-3E 34 66 21 69 17 67 22	i.p.t. 9>4f!i.g"
0040:0030	31 02 0D 1C 67 22 20 39-3C 33 73 1F 63 2E 00 00	1...g" 9<3s.c...
0040:0040	A6 00 4B 01 08 5D 00 B1-20 07 50 00 00 10 00 00	..K..].. .P.....
0040:0050	00 18 00 00 00 00 00 00-00 00 00 00 00 00 00 00	....
0040:0060	0C 0B 00 B4 03 29 20 00-00 00 00 00 BD E4 0E 00	.....) ....
0040:0070	00 00 00 12 00 02 00 00-01 14 14 00 01 02 00 00	....

Figure 1. DEBUG dump of Z150 RAM beginning at address 0040:0000. Upon bootup, the first 16 bytes of this area of memory are loaded with a map of the locations of programmable hardware. By manipulating this memory-mapping, you have the ability to manage hardware. (See Listings 1-3.) This memory dump shows the memory-mapping in a machine with only COM1 and LPT1 port devices.

Beginning Address	Contents of Memory	ASCII Representation
0040:0000	F8 03 F8 02 00 00 00 00-78 03 78 02 00 00 00 00	........x.x.....
0040:0010	7D 84 00 00 02 C0 01 00-00 00 28 00 28 00 66 21	}.........(.(.f!
0040:0020	69 17 67 22 31 02 0D 1C-67 22 20 39 3C 33 73 1F	i.g"1...g" 9<3s.
0040:0030	63 2E 72 13 69 17 70 19-74 14 20 39 3E 34 00 00	c.r.i.p.t. 9>4..
0040:0040	4B 00 FF 01 02 45 00 A4-20 07 50 00 00 10 00 00	K....E.. .P.....
0040:0050	00 02 00 00 00 00 00 00-00 00 00 00 00 00 00 00	....
0040:0060	0D 0C 00 B4 03 29 20 00-00 00 00 00 ED 90 0E 00	.....) ....
0040:0070	00 00 00 12 00 02 00 00-01 14 14 00 01 02 00 00	....

Figure 2. Here the '150 has COM1, COM2, LPT1 and LPT2. Compare to Figure 1 to note the new information at addresses 40:0003-40:0004 and 40:000A-40:000B.

Beginning Address	Contents of Memory	ASCII Representation
0040:0000	F8 02 F8 03 00 00 00 00-78 02 78 03 00 00 00 00	........x.x.....
0040:0010	7D 84 00 00 02 C0 01 00-00 00 2C 00 2C 00 20 39	}.........,.,. 9
0040:0020	3E 34 66 21 69 17 67 22-33 04 0D 1C 67 22 20 39	>4f!i.g"3...g" 9
0040:0030	3C 33 73 1F 63 2E 72 13-69 17 70 19 74 14 00 00	<3s.c.r.i.p.t...
0040:0040	4F 00 4B 01 08 5D 00 B1-20 07 50 00 00 10 00 00	O.K..].. .P.....
0040:0050	00 18 00 00 00 00 00 00-00 00 00 00 00 00 00 00	....
0040:0060	0D 0C 00 B4 03 29 20 00-00 00 00 00 EA 9D 0E 00	.....) ....
0040:0070	00 00 00 12 00 02 00 00-01 14 14 00 01 02 00 00	....

Figure 3. Memory dump after the port assignments for COM1 and COM2 have been swapped, as have LPT1 and LPT2. (Compare to Figure 2.)

```
/*
** swaplpt -- swaps LPT1 and LPT2 on IBM compatibles
**
** By Joseph Katz for "C Notes" in SEXTANT
** Version 1.00
**
** NOTE: there must be more than one LPT port installed
** or this program will hang the computer.
**
** requires SWAPS.ASM
** LINK swaplpt+swaps;
*/

#include <stdio.h>

main()
{
lpt_swap();
exit(0);
}
/* SWAPLPT ends */
```

Listing 1. SWAPLPT.C. Written for an IBM compatible, this calls the assembler routine _LPT_SWAP, found in SWAPS.ASM (Listing 3). The _LPT_SWAP routine swaps port assignments of LPT1 and LPT2.

starting address for the line—i.e., the address of the first byte in it—so you have to calculate the addresses for any other bytes that interest you. It's easy to calculate these addresses provided you remember to count in hexadecimal.

Our most interesting line runs from offset 0000 through offset 000F. (The dash in the center comes between 0007 and 0008, making a handy place-marker when you pick up speed in using DEBUG.)

Moving to the center now, most of the line is zeroes. These are null bytes to fill spaces where there are no port addresses.

In fact, there are only two port addresses in the area 40:0000-40:000F because there are only two ports in standard IBM-compatible microcomputers such as the Z158 and Z241. Look at the back of your computer and you'll see them: one serial port, and one parallel port. The first conforms roughly to the RS-232 standard, and the second conforms roughly to the Centronics standard. You call them COM1 and LPT1. The computer knows them as hardware residing at ports 03F8h and 0378h.

What you see in the DEBUG dump is in fact a map to the ports; software that checks address 40:0000-40:0001 for the location of COM1 is directed to port 03F8 hexadecimal, and software that checks address 40:0008-40:0009 for the location of LPT1 is directed to port 0378h. Since the map is maintained in RAM, what we have is "memory-mapped" hardware.

Memory maps are exciting because they can be changed easily, which really is the point of managing hardware with them instead of with circuitry alone.

For example, I recently installed one of Boca Research's BocaIO/AT boards in my H241 to add a serial port and a parallel port. I was acquiring an Apple LaserWriter, which is a serial printer, and already had an Epson FX-185 and Radio Shack Daisy Wheel II, both of which are parallel printers, and it had become a nuisance to keep switching cables. Because the '241 is memory mapped, it made more sense to add ports, leave each device plugged into its own port, and switch port addresses with software.

(We'll get there soon.)

So I installed the BocaIO/AT in a spare slot on the '241. Boca Research's IOFIG program let me write to a programmable ROM chip on the board so that the BocaIO/AT would know that its serial port was to be COM2 and its parallel port was to be LPT2. Then I rebooted the computer.

When I used DEBUG again, the map at 40:0000-40:000F had changed to reflect the additional hardware. Look at Figure 2 and you'll see the null bytes at 40:0003-40:0004 and 40:000A-40:000B replaced with the bytes "F8 02" and "78 02," which means that COM2 is port 02F8 and LPT2 is port 0278.

COM1 and COM2 are the standard serial ports and LPT1 and LPT2 are the standard

parallel ports supported by MS-DOS on IBM-compatible microcomputers. You can swap them.

A sweetheart in every port

The trouble with having two parallel ports is that I plug the wrong printer into each. It doesn't matter whether I've attached my Epson dot-matrix printer to LPT1 and my Radio Shack daisy wheel to LPT2 or *vice versa*. Sooner or later, the assignments turn out to be wrong for some program from which I desperately need to start printing right now.

Many programs can be configured to send output through either LPT1 or LPT2. However, that decision often must be made when the program is installed, and usually can't be changed except by reinstallation. The same thing holds true of many programs that have serial output.

In fact, I run into more confusion with serial devices than with parallel devices—simply because I use more serial devices. I have enough so that even two COM ports aren't sufficient—partly because I plug them in and out of the system without much thought to planning what should go into COM1 and what into COM2. I don't think such planning is even possible, at least not for me.

What I do instead is fiddle the map. That way, if a program sends output to LPT1 and I have the other printer connected there, I simply swap assignments in RAM so that the ports for LPT1 and LPT2 go to each other's address. I do the same thing when I encounter the same problem with serial devices, swapping the information at the addresses for the two COM ports.

It's easy. Take a look at Figure 3 for a dump of our line at 40:0000-40:000F to see what happens when the assignments for *both* COM ports and *both* LPT ports are swapped.

The way I swap ports is with two short C programs, SWAPLPT and SWAPCOM. They're really more assembly language programs than they are C programs, because the swap functions are written in assembly language. In effect, I've written two *loaders* in C: they take care of getting the swap functions in and out of action. Look at Listing 1 for SWAPLPT.C and Listing 2 for SWAPCOM.C, and you'll see what I mean.

So why bother using C at all? I wanted reasonably small programs built around core functions that I could recycle into other programs written for various C compilers. Properly done functions written in assembly language fit that complex bill of requirements. (If you haven't yet read my "C Notes" in the November-December 1986 issue of *Sextant*, you really ought to do so now. It laid the groundwork for what we're building here.)

Most C compilers for MS-DOS have library functions that allow you to manipulate the computer's memory through the microprocessor's registers; this is what must be done to swap port assignments.

But those functions usually are generalized as much as possible—in order to handle as many different jobs as possible involving direct register manipulations. Having more overhead than I needed, those functions tend to produce bigger programs than I wanted.

All I needed was to do a couple of specific quick and dirty jobs, not anything general. SWAPLPT and SWAPCOM therefore presumably are smaller than they would have been if written using the prefabricated functions supplied in the libraries of many compilers.

Although I've written the core functions for Version 4 of Microsoft C, you should be able to adapt them to any other standard MS-DOS compiler with just two or three changes. In SWAPS.ASM (the source code in Listing 3), change the sections labelled "Prologue" and "Epilogue" to reflect the calling conventions of the new compiler. Also, change the function names if the new compiler does not use leading underscores in function names. Versions 3 and 4 of Microsoft C do use them. I haven't seen version 3 of Computer Innovations C86 yet, but I understand it will be completely compatible with Microsoft C; so it should use them, too. The business end of the functions themselves should not need changing.

If you study the functions _LPT_SWAP and _COM_SWAP, you'll see that they're so similar as to be almost the same. The only difference is the offsets of the two addresses whose contents we swap in each function. What each function does is exactly the same—each provides the Prologue and Epilogue needed to satisfy the conventions of Microsoft C, and performs the housekeeping chore of saving and restoring register BP so we can get

SIRIUS SOFTWARE INC.

★ YOUR AUTHORIZED ZENITH DEALER ★

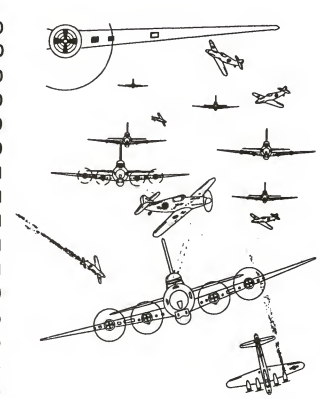
We have all types of high quality Zenith computers.
Z-148's, Z-158's, Z-181's, and the hot Z-248
Please call for pricing in the configuration you need.

OUR OWN QUALITY SIRIUS SOFTWARE

BERLIN: Control over 100 planes at once while you take command of the air war over Europe during WWII. Play the American side or the German side against the computer. Berlin is for the Z-100 only. (One or more players.)
$39.95

SUPER TREK: A space war game in full color graphics. Do battle with the dreaded Klgltes. Avoid worm holes, experience black holes. Super Trek is for the Z-150 or Z-100.
$29.95

Z-148 starting at	$1039.00
Z-158 starting at	$1599.00
Z-181 starting at	$1899.00
Z-248 starting at	$2799.00
20 meg HD/with con.	$499.00
40 meg HS drives w/o con.	$949.00
80 meg HS drives w/o con.	call
Easy PC Emulator	call
Easy Win (Z-100 HD)	call
Printers (LQ & DM)	call
Color Monitors	call
Pro Design II	$239.00
Jet	$42.45
Flight Simulator	$42.45
Orbiter	$42.45
Moonmist	$33.95
Xtree	$42.45
Hot	$59.95
dBase, Q & A, and hundreds of others	call



BERLIN

VISA

Orders Only
Please PHONE
1-800-423-7801

Florida Residents
Inquiries
1-305-971-8068

SIRIUS SOFTWARE, INC., 1524 N.W. 65th Ave., Margate, FL 33063
Add $2.00 or 2% minimum for shipping and handling

Circle #212 on Reader Service Card

in and out of action safely.

Look at _LPT_SWAP. First, we point at the appropriate memory segment (40h) for our two addresses. Doing so requires some register juggling because our program will not be running in memory segment 40h; that segment is reserved for BIOS functions.

We don't know or care what segment will be used for running our program. (It will depend on the amount of RAM available in the computer at the time.) But we do know that we will have to cross from that segment to segment 40h and then return. We're performing an "intersegment operation." What we need to do, therefore, is handle the segments through register ES, which is used for intersegment operations.

Unfortunately, we can't manipulate register ES by moving data in and out of it directly. We have to use indirection. Before our program changes the segment value that is stored in it, we PUSH the ES register to save its state. That way, we mark our place as the current segment so we can return to it with a POP when the swap is complete.

Then we move the destination segment number—40h—into register AX, which can be addressed directly. We're using it as a "scratchpad register"—as a temporary storage place for the segment word we want moved into ES. Next, we MOV the segment word into ES. The ES register now contains the destination segment.

Having set the segment in ES, we need now to complete the addresses that we want to fiddle with.

Offsets from segments are easy to handle because they involve "intrasegment operation," and any two of the four scratchpad registers—AX, BX, CX, or DX—will do. We use two because we want to swap the contents of two addresses.

So, we MOV into AX whatever word (two bytes, if you recall) is pointed to eight bytes in from the start of segment 40. Then we MOV into BX whatever word is pointed to ten bytes in from the start of segment 40. Each of those words is the current address of an LPT port.

Once we have the addresses right and their respective contents in AX and BX, all we do is complete the swap. AX contains whatever was at 40:0008h, and BX contains whatever was at 40:000Ah; so, we MOV the current contents of BX into 40:0008h, and MOV the current contents of AX into 40:000Ah.

At last, our swap complete, we return to our starting segment with a POP ES—which restores our place there. And we return to our place of execution with a POP BP. All that's left now is the RET that terminates the function and returns control to the C program with which we invoked the activity.

Now when a program sends its output to LPT1 at the address where it's supposed to live, the output goes to LPT2 instead.

```
/*
** swapcom -- swaps COM1 and COM2 on IBM compatibles
**
** By Joseph Katz for "C Notes" in SEXTANT
** Version 1.00
**
** NOTE: there must be more than one COM port installed
** or this program will hang the computer.
**
** requires SWAPS.ASM
** LINK swapcom+swaps;
*/

#include <stdio.h>

main()
{
com_swap();             /* in SWAPS.ASM */
exit(0);
}
/* SWAPCOM ends */
```

Listing 2. SWAPCOM.C. Similar to SWAPLPT.C in Listing 1, this program calls an assembler routine to swap the COM assignments in a Z150 or other IBM compatible. The assembler routine is _COM_SWAP in Listing 3.

Listing 3. SWAPS.ASM provides the subroutines _LPT_SWAP and _COM_SWAP, to swap the port assignments of the LPT and COM devices. Although written for Microsoft C version 4, it can easily be converted for other compilers.

```
; SWAPS.ASM VERSION 1.0 BEGINS
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
; SWAPS.ASM -- functions to swap LPT and COM ports
; Copyright (C), 1987, by Joseph Katz
;
; Version 1.0
;
; Assemble to SWAPS.OBJ with Microsoft Macro assembler:
;    MASM swaps;


;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;
; PROLOGUE FOR MICROSOFT C 4.0 SMALL MODEL
ASSUME CS:_TEXT
_TEXT   SEGMENT PUBLIC BYTE 'CODE'
; PROLOGUE ENDS
;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;
;
;   void lpt_swap()--swap LPT1 and LPT2
;
;   address for LPT1 is 40:0008
;   address for LPT2 is 40:000A
;

        PUBLIC  _LPT_SWAP
_LPT_SWAP       PROC    NEAR
        PUSH    BP
        MOV     BP,SP
;
; SET SEGMENT AT 0040H
        PUSH    ES                      ; SAVE EXTRA SEGMENT
        MOV     AX,0040H                ; SEGMENT
        MOV     ES,AX
; GET CURRENT PORT ASSIGNMENTS FOR LPT1: AND LPT2:
        MOV     AX,WORD PTR ES:[0008H]
        MOV     BX,WORD PTR ES:[000AH]
; SWAP THOSE ASSIGNMENTS
        MOV     WORD PTR ES:[0008H],BX
        MOV     WORD PTR ES:[000AH],AX
        POP     ES                      ; RESTORE EXTRA SEGMENT
;
        POP     BP                      ; RESTORE BP
;
        RET
_LPT_SWAP       ENDP
;
;


;                                                                    ➔
```

```
;   void com_swap()--swap COM1 and COM2
;
;   address for COM1 is 40:0000
;   address for COM2 is 40:0002
;
        PUBLIC  _COM_SWAP
_COM_SWAP       PROC    NEAR
        PUSH    BP
        MOV     BP,SP
;
; SET SEGMENT AT 0040H
        PUSH    ES                      ; SAVE ES
        MOV     AX,0040H                ; SEGMENT
        MOV     ES,AX
; GET CURRENT PORT ASSIGNMENTS FOR COM1: AND COM2:
        MOV     AX,WORD PTR ES:[0000H]
        MOV     BX,WORD PTR ES:[0002H]
; SWAP THOSE ASSIGNMENTS
        MOV     WORD PTR ES:[0000H],BX
        MOV     WORD PTR ES:[0002H],AX
        POP     ES                      ; RESTORE ES
;
        POP     BP                      ; RESTORE BP
;
        RET
_COM_SWAP       ENDP
;
;
;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;
; EPILOGUE FOR MICROSOFT C 4.0 SMALL MODEL
;
_TEXT           ENDS
                END
;
; EPILOGUE ENDS
;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
; SWAPS.ASM VERSION 1.0 ENDS
;
```

It's like sending mail addressed to "Occupant." To restore the original port assignments for LPT1 and LPT2, all that need be done is run SWAPLPT again. Be my guest: run it as often as you want.

SWAPCOM is now easy to explain: it does the same thing as SWAPLPT, but it does it for the COM ports and, therefore, at different addresses. That's the entire explanation.

Zview notes

Last issue (*Sextant*, January-February 1987), I said that Data Management Consultants' Zview "is the most sophisticated and complete screen generator" I've seen so far. I still think so. One of the few things I didn't like was the manual, which was nearly incomprehensible.

Right after I sent that column off, Dan Carpino telephoned to find out my reactions to the package. I told him. Much to my astonishment, version 2 of Zview arrived several weeks later with a new manual.

Version 2 of Zview really is a major new version of the program as well as a major revision of the manual. There hasn't been time yet, or the occasion of a project, to immerse myself in this new Zview; so, I just don't know enough of the new details to say more than that it's a new version.

But I have done a quick tour through the manual, and at first glance it seems to leave little room for big objections. You should be able to get Zview up and running easily with this manual.

Now that's extraordinary. Just as I finished writing the last paragraph, our dog barked to say the postman had arrived. Today's mail has brought an upgrade to version 2 of Zview. These updates to Zview are free. My final comment last month was this: "Not the least of its notable features is Data Management Consultants' commitment to supply registered owners with free upgrades."

What we have here is a good package from a company dedicated to its improvement and growth at no continuing cost to its customers. I've never before seen any software company operate that way. I like that way of doing business. I like Zview, too.

Ordering Information

Microsoft C Compiler (version 4), $450.
Microsoft Corporation
16011 N.E. 36th Way
Redmond, WA 98073-9717
800/426-9400; in Washington and Alaska, 206/882-8088; in Canada, 416/673-7638
Call or write for dealer nearest you.

Zview (version 2), $245.
Data Management Consultants
5325 South Valley View Blvd., Suite 7
Las Vegas, NV 89118
800/423-0930, 702/798-5910 △

H/Z-25
Super Chip Set

- 4 Chip Set
- 256 Characters
- Double Strike
- Super/Sub's
- Underline
- Italics
- Hex dump
- Dot Graphics

$94.95 +S&H

FINA SOFTWARE
16144 Sunset Bl. #3
Pacific Palisades
California 90272
213/454-6393

Circle #164 on Reader Service Card

HARDWARE
HEATH/ZENITH

SURPLUS - SALVAGE - ETC.
Most Circuit Boards for the Heath/Zenith Line, Z-100, Z-241, Z-158, Z-151, H-89, Z-171, Z-148. Cabinets, Disk Drives, Power Supplies, C.R.T.'s, Keyboards, Cables, H-DOS Operating System. $5.00 HTX-11 Keyboards $2.50 Ea. (NEW) 20 or More $1.00 Ea. (NEW) L.C.D. 171 $20.00 Ea. (NEW) 171AC Power Supply $25.00 Ea. (NEW) Modem 171 $100.00 Ea. Coaxial Cable (for Networking) 100 ft. Long $35.00 Ea. 25 ft. Long $20.00 Ea. Call or Write for a Price List - Continually Getting More Stock Each Month - Shipped U.P.S.-C.O.D.

SAVE THIS AD!

Self Addressed Stamped Envelope to:
Al Davis
4894 Lake Chapin Road
Berrien Springs, MI 49103
Phone: (616) 471-1792

CHEAP PRICES!

Circle #122 on Reader Service Card

. . . *Software Developers* . . .
develop your software to work with most of the desktop printers on the market!

DOT DIASY LASER COLOR JET

CARDINAL POINT INCORPORATED has published (3) three volumes of the "**PROGRAMMERS' HANDBOOK OF COMPUTER PRINTER COMMANDS . . .**" Each book contains the ESCAPE and Control Code sequences for most of the personal printers made by leading manufacturers both old and new. Each book is 5½" x 8½", spiral bound, and contains an easy to use table-format. Codes are listed in text-form with hex and decimal equivalents and detailed function descriptions. The information is not duplicated from one volume to the next.

1. Vol I - '84 ____ $37.95 **4. Vol III - '86 ____ $26.95**
2. Vol II - '85 ____ $26.95 **5. 3 Vol Set ____ $77.95**
3. 2 Vol Set (I & II) ____ $58.95 **6. 2 Vol Set (II & III) $49.95**

(Indiana residents add 5% sales tax. Please add $3 s/h (UPS reg.) per order. Quantity Orders or Dealer Inquiries may call collect. TO ORDER CALL: (812)-876-7811, (M–F, 9-5 EST) For more detailed information, write:

Cardinal Point INCORPORATED
P.O. Box 596-Dept-A, Ellettsville, IN 47429
We accept MC, VISA, MO, P.O.s–same day shpg.
Cks–allow 14 days. CODs– extra. UPS Blue–$5 shpg.

Circle #199 on Reader Service Card

Prologue

You're invited to a birthday party put on by a five year old.

John Walker

Sextant has passed a milestone: five years. They've been five eventful years—nearly half the life of the microcomputer industry. Zenith had purchased Heath Company about two years before *Sextant* began publication. Five years ago, many of the earliest microcomputers (such as the H8, then almost five years old) were still quite competitive with their newer rivals. IBM had barely begun its attempt to dominate microcomputing.

Then, the microcomputer market went through a series of upheavals. First, many companies—Zenith among them—decided that survival dictated IBM compatibility. For Heath/Zenith that decision produced the H/Z150, a nearly perfect clone of the IBM Personal Computer.

Next came what some saw as the "collapse" of the microcomputer market—more accurately, a slow-down from the skyrocketing growth of the first few years.

For Heath/Zenith, of course, the collapse never came. The Navy and Air Force chose the '100 as their standard micro. Colleges and universities did the same. When the military decided on IBM compatibility, the '150 became their choice. Heath/Zenith's major problem would be filling orders.

The upheavals had settled down by some time last year. The "clone builders," Zenith among them, had followed IBM's lead and built computers based on the 8088 central processor chip. They followed IBM again when it used the 80286 chip in the AT. But while compatibility had been imposed on the market, IBM's own growth had stalled.

Now, however, we may very well be getting set for major changes again. IBM has held back from using the still more powerful 80386 chip. Companies like Compaq and Heath/Zenith have moved into that area on their own. (See page 90 for a description of Zenith's new Z386.)

Getting a recap of five years

We felt it would be good to take a look at how these past five years have changed the Heath/Zenith community. We wanted a recap. To get it, we went to people we knew had been around: our subscribers, advertisers, and authors.

The vendors and subscribers to whom we sent questionnaires have all been with us since *Sextant* started in 1982. That was about 20% of our current advertisers and 10% of our current subscribers.

Commitment

If you're a newcomer to the world of Heath/Zenith users, perhaps I should prepare you a bit.

First, Heath/Zenith users are committed. We got a response rate that many magazines would find remarkable: 30% of our subscriber sample (with only one mailing), three-quarters of the authors questioned (with one mailing and a follow-up), and practically all the vendors (two mailings and a few phone calls).

Reply rates of 30%, 75%, or nearly 100% would leave most publications stunned. In *Sextant*'s experience, Heath/Zenith users *always* come through like that. If our questionnaires hadn't had to go out during the Christmas-shopping period, the response probably would have been even better.

. . .and candor

Two other notable features of Heath/Zenith users may be their candor and the level of their knowledge. Let's just say they're not shy about letting you know if something isn't going the way they figure it should be.

One of our authors, Joe Katz, came to the Heath/Zenith world after using a Radio Shack computer. He wasn't quite prepared for the knowledge level of the users he found here. Nor was he prepared for computer users who took "freedom of speech" *very* seriously.

"You folks knew what was going on under the hood, and you chattered about it constantly. Complain, complain, complain: never before had I heard such continual griping about one brand of microcomputer and its manufacturer from the people who owned them. My immediate thought was that you had been trapped into buying bunches of junk you were trying to keep running. Then I came to realize that I was observing knowledgeable people, but odd, trying to push fine equipment to its limits. . . . By the way, my impression is that you still complain infinitely more than any other group of microcomputer users."

Some unanswered questions

As I've said, this special section is a recap of the past five years—it's not a prophecy. But prophecies (accurate ones, anyway) are hard to come by. A good recap, though, does something almost as good: it points out those things we ought to be thinking about.

So, in reading this fifth-anniversary section, I hope you'll be drawn to think about three areas of change: technology, proficiency, and community. All three influenced the answers to our survey questions. And in all three areas, this recap raises questions for the future.

The impact of technology is obvious: the computers and the software have changed. They're faster and more powerful.

Moving on to the issues of proficiency and community, the facts aren't always so clear. Many of our respondents felt that a change in user perspective is taking place. Computing is no longer something to be learned for its own interest. Now the emphasis is on using computers to accomplish practical ends. Right now, this change seems to have produced a sense of loss in a number of people.

For the future, though, I think the big question concerns the attitudes and technical proficiency of the newer users. In a time of change, differences may be more obvious than similarities. But switching to "applications" doesn't mean that people will accept poor design; it doesn't mean they don't care about excellence.

So, as you read this fifth-anniversary recap, I hope you'll use it to develop some ideas about the issues facing the Heath/Zenith community in the future. At the very end, I'll take up this theme again. △

Controlled Data Recording Systems Inc.

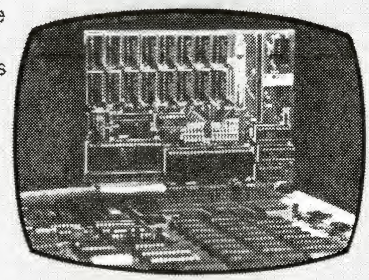
Quality Products and Support for the Heath/ Zenith Community

New for the H/Z89-90 Computer Users:

The Super RAM 89 Package

Now get the speed and power of a high capacity Ram Drive System at a reasonable price.

Using the Ram 89 package, standard software shows an immense improvement in speed. Depending on the software being run, programs may execute 10 times faster than when run through standard floppies.



Now get RAM 89

HDOS DRIVER Software Only **$35**

RAM 89 DVD supports RAM SY0: and SY1:, added autoload features, plus more!

Ram 89 comes as a two card set that plugs into the left hand (16k expansion) side of the computer. No computer modifications required.

Board 1 has two banks of 256k chips possible for a total of 512k. Either or both banks are able to use 64k chips instead. Board 1 can be used by itself, with board 2 added at a later date.

Board 2 has an additional 512k, plus it has a real time clock capability, and a SASI interface hardware capability. Board 2 piggybacks onto board 1.

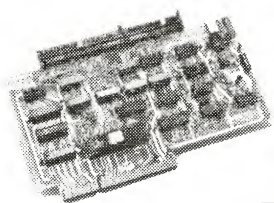
The Ram Drive Software (SRAM) allows one or two logical ram drives. The ram drive(s) can be located starting anywhere from logical A: to O: (standard drives get relocated). SRAM can be set to start at logical A: and warm boot with ram (no floppy disk accesses needed). Ram drive attatches to any of the versions of CP/M 2.2 bios used in the H/Z89-90.

GET A FULL MAGABYTE OF RAM FOR YOUR H/Z89-90

Board 1 includes hardware manual and ram drive software with no ram: $190.00. Each 256k bank, add $56.00. Board 2 (must have board 1). With no ram, no clock, no SASI $90.00. Each 256k bank, add $56.00. Ask about clock, SASI pricing.

FOR THE H/Z89-90 COMPUTERS

THE ONE CONTROLLER FOR 8" & 5.25" DRIVES THE FDC-880H PRICE:$395



Includes controller board CP/M boot prom, I/O decoder prom, hardware/software manuals BIOS source listing. HDOS driver now available for $50.00.

Now be able to run standard 8" Shugart compatible drives and 5.25" drives (including the H37 type) in double and single density, automatically with one controller. The FDC-880H operates with or without the Heath hard sectored controller.

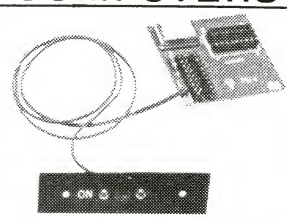
Z100 HARDISK CONTROLLER

The CDR317 is the ULTIMATE IN HARD DISK controllers for the H/Z110-HH/Z120 computers

- Direct replacement for the Heath/Zenith Z217 hard disk controller package.
- Able to work with standard ST506/412 type Winchester Drives and the cartridge removable Syquest Drives.
- Works with all standard Heath/Zenith drivers, operating systems, and Z217 Boot Roms.
- Is an intelligent SCSI host adaptor for future network expansion.
- Less expensive than the Z217 controller.
- Available now through your local Heath/Zenith dealers.

FOR THE Z100 COMPUTERS

THE ORIGINAL Z100 SPEED MODULE. RUN YOUR Z100 PROGRAMS FASTER



The ZS100 runs the Z100 CPU 50% faster, (7.5 MHZ) in 8088 mode. The ZS100 installs easily with no soldering. The ZS100 is externally switchable between speed mode and normal. The ZS100 improves the time performance of applications packages with no software modifications needed. The ZS100 is for all Heath/Zenith 100, 110 and 120 series computers.

SUPER DRIVES 85

A powerful floppy drive package for the Z100 or any computer that can use 8" floppy drives.

Two extended technology 5.25" drives in a package with interface cables, case and power supply, that look exactly like standard 8" floppy drives to the computer. Now have **2.4 megabytes** of **floppy file storage capacity** in one 5.25" package.

ONLY **$495** LIST

Dealer inquiries invited.

For information about these products contact
Controlled Data Recording Systems Inc.
7210 Clairemont Mesa Blvd
San Diego, Ca. 92111 Phone (619) 560-1272 or contact a Heath/Zenith dealer that carries the C.D.R. Systems Inc. line of products
New - C.D.R. Systems Bulletin Board (619) 560-8929

Circle #108 on Reader Service Card

Diverse Writers; Mixed Views

Our more prolific authors share their opinions on what they see happening to themselves and other Heath/Zenith users.

John Walker

To celebrate our fifth anniversary, we figured it was time to see where we'd been and where we are now. So, we sent out questionnaires to the 43 authors who'd published more than one article in *Sextant* since we started.

Most of those writers who responded had already jumped into Heath/Zenith microcomputers before *Sextant* came along. Almost all of them started out with an H8 or H/Z89, and more than half mentioned having built their computers from the kit.

Going over their replies, I couldn't help looking at some of their points in light of the stereotypes offered by the general news media.

Listening to the media, one might conclude that micros exist almost solely for business use. To the extent the media have paid attention to personal use, they have been divided. On the one hand, they've described it in terms of exclusively practical uses (bookkeeping, check balancing, etc.). On the other hand, they go for the cute and trendy—games predominate.

(Much of the evaluation wobbles between the futuristic and the threat of workers being replaced by micros. Even today, I see many people who have problems accepting microcomputers as a "respectable" part of the everyday world.)

Great expectations—how to succeed in business?

What were you using your computer for in 1982? (Or when you first started using it.)

John Walker has been Sextant's *technical editor since its start. Although he now uses the '100 to edit articles, he is still a die-hard H8 user.*

Looking at our authors' replies, I found there was a large gap between them and the expectations I might have if I paid attention to the media.

According to the media, it seems the most predicted and unthreatening use for computers is in a business setting. In fact, though, only a few of our authors indicated they originally used their computers to do things like budgeting a business or controlling an inventory.

> ***The motive to write was simple: "my utter fascination with computers."***

Among those few, both Bill Adney and Robert Rasch started out using '89s to track the budget in the departments in which they worked. For Bob Rasch, at least, microcomputers also helped him use computers in a teaching environment. It had always been theoretically possible to use the university mainframe as a teaching tool or to track tests, but the practical obstacles were usually too great.

And Don Carter used his H8 in his boat-building business. It "took over all the work of a wheezy Imsai 8080—every task from calculating the changes to MORC ratings [because of] changes to rigging, to listing the details of the huge inventories that go into construction of a hundred-foot yacht. Plus billings."

Other than those three, however, Bill Tavolga was the only respondent with a clearly "business" justification for his computer—in his case, an H8. Besides handling a marine lab's payroll, etc., his use of the '8 was much more in keeping with the scientific/technical image of much larger computers. It was "on line with some of my experiments on hearing in fishes." His '8 controlled timing, equipment, stimulus presentation, and detection of subject responses.

. . .games?

Games are another stereotypical use for computers. Interestingly, though, we had only two authors say that games had attracted them to computers.

Ed Byrnes admitted to being hooked by Adventure. (However, I don't think that Adventure quite fits the popular idea of a "computer game," that is, an arcade game. Adventure and its siblings and spinoffs are the original—and to some of us, the only "true"—computer games.)

Only one author, Rick Lutowski, mentioned *arcade* games as his "justification" for purchasing a computer. And Rick didn't want to just *play* games—he wanted to *write* them. (Rick is also the only author to indicate that he never did realize the original ambition he had for his computer. He got sidetracked into assembly language.)

. . .or home finance?

Finally, many of us probably first thought of personal computers in terms of some general fuzzy ideas about things that seemed as though they'd be easier to do on computers than by hand. We could do word processing or do mailing lists or bookkeeping. Well, about half of our authors used their computers in some such way. Not surprisingly, word processing was part of their plans.

While word processing can be considered a "home use," however, it might be useful to distinguish between word

processing and all those other "home uses" (balancing the family budget, etc.). If we make that distinction, then home use was even less of a factor than business needs. (Only three authors, Charles Cohn, Ken Daniel, and Hugh Kenner, mentioned things like home bookkeeping, etc.)

Among the "practical" reasons for owning a microcomputer, word processing wins hands down, with 11 respondents mentioning it as a task to which they put their original computer.

For six of our authors, though, word processing wasn't merely a "home use." They had already been writing full or part time before they came to Heath/Zenith computers. (Tom Sear had published in *Popular Electronics* before microcomputers hit the scene, and Don Carter had been in *Rod and Gun* and the *Toronto Star* before *computers*, not just before micros.)

What else is there?

Even word processing, however, was not the reason most often mentioned for getting a computer.

More than half didn't really emphasize "practical" applications at all. Instead, they told us they just wanted to learn about computers. They wanted to learn programming or they wanted to tinker with the hardware. (Programming was the most frequently mentioned interest.)

And, apparently, this was usually not an attempt to gain professional training. Only a few of our authors came to Heath/Zenith as computer professionals. (By 1982, though, Bill Clarkson was an independent software developer, and Ken Patrick was a consultant. Hal Glatzer had written about word processing, and Walt Jung had a book out on integrated-circuit chips.)

So what are these guys like?

Beyond the willingness to poke around inside software or hardware, our authors seem to be a pretty diversified lot.

Some, like Ray Dotson, had already been involved with computers in the '60s. The computers he dealt with then were "huge room-size Burroughs giants." To program them, "We moved wire jumpers around on a board." For Ray, these computers didn't seem to have any real appeal: "Not enough contact with the real 'guts,' I suppose."

Others, according to decent, proper stereotypes, had no business getting into computers at all. Take the stereotype of academics as being butterfingered and untechnical. Well, Hugh Kenner was a nice respectable English professor and literary critic. Showing no concern at all for seemly behavior, he went and built his '89 from a kit. He has even admitted to getting his teen-aged daughter to help. (There is no respect for stereotypes.)

Joe Katz is another English prof become hacker. He is now completely addicted, and has also shamelessly enticed his family into it.

These two each pointed out how a "non-technical" profession was really waiting for microcomputers. Word counts and vocabulary analysis are just two items of literary drudge work that suddenly became easy with the advent of microcomputers.

Well, what now?

What do you use it for now?

Generally, our authors seem to have "grown" rather than "changed"—although the growth might have been pretty dramatic.

For instance, Bill Hall moved into programming full time after having been a mathematician and editor. Robert Schlessman is going for his bachelor's in computer science. Ken Patrick and Ray Dotson are now dealers for Zenith Data Systems (ZDS). And Ray assembles and sells his own computers from components. Ed Byrnes sells his software as an independent vendor, and he works part time at the local Heath/Zenith store while going back to school for a teaching certificate. Bill Clarkson and Jim Hassall are still involved as independent vendors.

Bill Adney and Wayne Rash both consult and write about microcomputers. Of course, Walt Janowski, Bill Locke, and Joe Katz have regular columns in *Sextant*.

Others have integrated micros into their non-computer professional activity. Joe Katz and Hugh Kenner have already been mentioned. And Walt Jung is another full-time writer whose life is made easier by a microcomputer.

But even those who are not using their computers "professionally" seem to have made it a point to become more adept users. Their articles are one measure of that, and activity in the local and national Heath/Zenith Users' Groups is another. You might know Herb Friedman, for instance, as one of the organizers of the annual Western Regional Heath/Zenith Users' Group Conference.

Late abandoners

Are you now using the same computer that you started with? If you are not using the same machine, which are you using and why?

Marketing people look for "early adopters" of new technology. Our writers are certainly that. They got in early and have kept pace. About three-quarters have gotten newer computers since their first one.

For want of a better term, however, I have to say that our authors *also* tend to be "late abandoners." About three quarters of those who responded still use the machine they started out with. About a third of those still use the "old" machine as their primary or sole computer.

Even among those who have "moved up" to newer models, the old ones are still in use, even if only as the family's "second computer." Ray Dotson has his '89 at the shore for word processing. William Tavolga is planning to dedicate his H8 to his ham-radio operation. Rick Lutowski stayed with his H8 until the '241 came out. And he still uses the '8 for much of his work.

Photo by Charles Floto

"The Heath/Zenith community has changed dramatically and deplorably in recent years because it has admitted people like me."—Joe Katz

Over and over again, authors pointed out: *it works*. The fact that they may also use much newer models doesn't alter that.

Technical excellence, too, plays a role. Charles Cohn observed that he still felt the Heath Disk Operating System was superior to CP/M, and regretted seeing most activity in the eight-bit world go over to CP/M.

In fact, "obsolescence" is only pushing some people to learn more. Kirk Thompson mentioned the dwindling support for his '89, and simply figured that "*now*, I will have to get serious about programming!"

Why write?

What led you to write about your computer?

Bill Adney pointed out how poor much computer documentation has usually been. "Virtually all of it was written by

programmers, and was totally unintelligible to just about everyone, including me. . . . I decided that I certainly could not write anything that was worse than what already existed."

For Sid Hack, the motive to write was simple: "my utter fascination with computers and what they can do."

But writing is not just a one-way street from author to reader. D. C. Shoemaker confessed that one of his purposes in writing was to find other Heath/Zenith users near where he was living. Finding them, he was able to help start at least three local Heath Users' Groups. And Jim Hassall commented that it's awfully nice to have people say that they'd read and liked his articles.

True, a number of our writers noted that they liked the money. But not even full-time writers could feed themselves writing only about Heath/Zenith computers. Jim Hassall commented that, for him, writing is "very time-intensive, relative to the return."

The bottom line is that the authors each found a subject that seemed worth their while, and they thought others would find the information helpful.

Hugh Kenner summed it up: "I write about anything that interests me."

And as far as the money is concerned, Wayne Rash pointed out that "I'm being paid to have fun. Who can ask for more than that?"

How have we changed? The down side?

We'd like to hear your thoughts about the Heath/Zenith community and how it's changed. Please comment on any aspect that's important to you.

The answers all pointed out the same underlying facts—mainly, it was the tone that was different from one person to another. The first fact was that Heath/Zenith had to go slow on innovation when it embraced compatibility with a certain machine that has Those Three Letters on it.

And the second fact was that the kit-builders, tinkerers, and hackers are now a smaller proportion of users than they were in 1982.

Regarding equipment, Hal Glatzer was one of a number of authors who were disappointed with "me-too" products.

Walt Jung's description of Heathkit and Zenith, however, indicated a slightly different view. He pointed out that their products have traditionally reflected solid, conservative design values. And they've produced "technically well designed units."

I think there's a certain tension between good design and being first. This showed up when the whole computer market shifted direction—towards IBM compatibility.

It's not that the products are poor—most of our authors insist they're still among the best. But something's gone. Ken Patrick, for instance, is still a ZDS dealer; but he pointed out that many of the really "innovative goodies" are too expensive for the ordinary hobbyist.

Again and again, writers mentioned the changing character of the user community.

Somehow, he felt, "it's not the *kick* it used to be."

A number of writers saw this change in Heath/Zenith products in terms of its impact on the user community. To Tom Sear, it seemed simply that Heath/Zenith had "dumped the hobbyist."

Bill Locke was "frankly, a little depressed." And he felt that it's important that Heath/Zenith return to the hobbyist market.

Again and again, writers mentioned the changing character of the user community. They seemed to feel that it's less cohesive, less close-knit, less interested in technology than it used to be.

Bill Adney, though, used an interesting example to point this out: you could see we were changing because fewer people were learning assembly language. Instead, we're writing in high-level languages, such as Pascal.

Try to name another computer where writing programs in Pascal could be used as an example of how the brand's users were becoming *less* technically proficient!

. . .the up side?

Most writers noted that there have been real benefits from IBM's entry into the micro market. Alan Moffet agreed that "The clones have pretty well taken over the market. . . ." But he wasn't sure that this is "a bad thing. It introduces an element of stability."

Ed Byrnes felt that "We've become a much larger community, with a much wider range of interests." He pointed out that "to remain where we were" would have cost us a lot, citing the advances in memory, etc., that have come in the past few years.

While recognizing the changes in the user community, a number of writers emphasized positive elements. The fact that the community is less "hobbyist" does not necessarily mean that it is less interested in proficiency and excellence. In Dave Felstul's words, Heath/Zenith users are still "the most computer-knowledgeable" that you will find.

Dave, though, is now going for his Master's, and has to put up with a "real world" of computers—one where users can show very little concern for competence, and where manufacturers can show very little concern for the interests of users.

So, for a *really* upbeat view, we only have to turn to an escapee from one of those "real" worlds: Joe Katz. He started out with Radio Shack—and took the first chance he had to jump into all of our "problems."

We certainly didn't do anything to *encourage* him. If I thought some of our authors were downbeat, they're starry-eyed optimists compared to the Heath/Zenith users Joe first met. "Never before had I heard such continual griping about one brand of microcomputer and its manufacturer from the people who owned them." Initially, he wondered whether they all bought junk.

Listening more carefully, he decided that Heath/Zenith users were either in "the forefront of microcomputers" or else they were "crazy as bedbugs." As well, he compared their experience to his. "Gad, you guys could get at the computer's guts, and I was threatened with lawsuits if I dared patch a program without authorization. I was locked out. You were ushered in. And in you went," complaining all the way.

And our authors *can* complain—even as they ignore every other brand as not even worth their complaints. Robert Schlessman listed his series of complaints as bluntly as you could ask. On dropping the '89: ". . .they blew it. . . ." On lacking an aggressive ad campaign: ". . .they blew it. . . ." And on some in-house personnel changes: ". . .they blew it. . . ."

Then he immediately followed up by saying that "In spite of all that, I still remain an avid Heath/Zenith user and supporter. They have technologically superior machines, and they always will."

Innovation is still needed

In the long run, I think the Heath/Zenith community will see a continual interplay between equipment and the

You're headlong into the computer age, but the last time you saw your desktop was August 1984. Ditch that swamped feeling! Get WRITE-HAND-MAN, the desktop organizer for your CP/M system. $49.95 from TMSI.

Circle #173 on Reader Service Card

people who use it. Ken Daniel, for example, wondered whether Heath/Zenith could "get into innovative add-on boards—which would keep hobbyist involvement."

In this regard, Heath/Zenith has at least provided the foundation. Their equipment is designed to encourage add-on boards. (For more on this subject, you might want to look at "Zenith: Planning for the Future," by Wayne Rash, Sextant #26, January-February 1987.) Their relations with the independent vendors are remarkably cordial. The Heath catalogue carries products from independents; HUG annually gives an award to one of the independents. (*Awards?!* Some other computer companies prefer to go on holy wars against the independents.)

However, it's not all just Heath/Zenith. Bill Clarkson pointed out that—in the general IBM-compatible marketplace—many independents "persist in ignoring Zenith" even when they go out of their way to ensure compatibility with some pretty "obscure" brands.

We may have to harass some of the newer independents just as much as we harass Heath/Zenith.

The whole nine yards

In general, our authors think the overall Heath/Zenith community is in good shape. When he was deciding how to move up to a more powerful machine, Rick Lutowski tried to look at "the whole nine yards": technical-hotline support, good documentation, good users' groups, long-term parts availability, good support from independent vendors for software, hardware, and publications. "When it comes to total-spectrum service," he concluded, "Heath/Zenith beats *everybody*."

The role of the independent vendors seems essential. Hugh Kenner observed, "Look at all that high-quality low-cost software." Don Carter was pleased that "in spite of tremendous growth . . . a phone call or a letter still brings cheerful assistance or advice."

On the level of *quality*, Dave Felstul finds himself "longing for some of the 'older' Zenith-compatible programs," even though he's "surrounded by the latest in IBM-compatible software."

The future?

In some sense, most of our writers pointed out the need to keep the values and advantages of a small close-knit community—and to communicate them both to large numbers of new users and to Heath/Zenith itself. The proportion who remember "the old days" is dropping. Wayne Rash pointed out that "Heath/Zenith users will have to take it upon themselves to make sure they're remembered." "Isolated Heath users" formed a cadre that was critical to Zenith's current success; they can be similarly valuable in the future. But they will need to support sound policies and make their views known.

Moreover, Robert Rasch reminded us that the Heath/Zenith community exists in a still larger community. He voiced the concern that too many people in the general community are "terrified" of computers. The country as a whole stands to lose a lot economically and socially unless these people can be brought into the world of computers. For Rasch, the presence of a healthy Heath/Zenith community "may help fend off" such a "disaster."

Well, we're off to a promising start. Take Joe Katz as an example: before becoming a Heath/Zenith user, he would have laughed at "any suggestion I'd be writing my own programs." Now, he's writing a column about C, trying to help others avoid all the mistakes *he* made.

Moreover, Joe's friends tell him he doesn't bore them nearly as much about all that computer stuff, now that he's got *us* to read his articles. And that allows him to take a very upbeat look at the identity crisis that so many long-time Heath/Zenith users seem to be experiencing.

To him, it's simple: "The Heath/Zenith community has changed dramatically and deplorably in recent years because it has admitted people like me. . . ."

Now, if only everything else turns out so "deplorably"! △

NEW RELEASE 1.6

CPA II

Personal Accounting for IBM PC Compatible Systems

A popular system now made even better! All the features of our earlier system, with many new ones. But, best of all. . .

NEW Pricing. . . Now only $59.00
NEW Features and Capabilities
NEW Hierarchical Menus
NEW Easy Set-up Procedure
NEW On-line Help Screens
NEW Mortgage, Loan, Investment and Depreciation Utility

Any number of Vendor, Cash and Checking accounts desired. User-specified Expense and Income categories. Check printing, auto-posting, spreadsheets, bar graphs, tax deductions, accounts-coming-due, budgets, and many other detailed reports. Auto-checkbook reconciliation. Easy user-command entry. Full edit capabilities. Fast and efficient. Can be used with any printer for all reports and bar graphs. Not copy-protected.

Requires 256K RAM, color video, RGB monitor, at least 2 disk drives (2 floppies, or 1 hard disk and 1 floppy), MS-DOS 2.1 or greater. Monochrome version to be announced.

RDS REICHERT DIGITAL SYSTEMS
29 BLAZIER RD. WARREN, N.J. 07060 (201) 469-3854

Circle #151 on Reader Service Card

COMPUTE THE VALUE.

ZF-148-41 (one drive, 256K)	$ 949.
ZF-148-42 (two drive, 256K)	1095.
ZF-158-41 (one drive, 256K)	1349.
ZF-158-42 (two drive, 256K)	1466.
ZW-158-43 (20 MB, 1 floppy, 256K)	1995.
└ UPGRADE TO 640K	49.
ZVM 1220 A Monochrome Monitor	109.
ZVM 1230 A Monochrome Monitor	109.
ZF-171-42 (dual floppy, lap top)	1749.
└ 10 MB hard disk (internal)	990.
Free carrying case and battery (LTD. QTY.)	
ZW-171-42 (10 MB, 1 floppy, 640K)	2789.
ZF-241-81 (1.2 mg floppy, 512K)	2615.
└ MS DOS 3.1, (no video adaptor)	
ZW-241-82 (1.2 MB floppy, 20 MB hard disk)	3364.
└ 512K, MS DOS 3.1, (no video adaptor)	
Video Adaptor STB EGA	195.
Monochrome Monitor - high resolution	149.
C. Itoh Color Monitor	429.
ZVM 135 Color Monitor	445.
└ Cable	22.

Our prices are worth a lot of savings to you!

computer grove inc

5223 Main Street • Downers Grove, IL 60515
312/968-0330

Circle #200 on Reader Service Card

Vendor Strategy: Growing by Adapting

It isn't easy to survive five years in the dynamic microcomputer marketplace. Meet some independent vendors who did.

Victoria Saxon

In honor of *Sextant*'s fifth anniversary, its editors sent a survey to the vendors who advertised in the magazine's first year and were still advertising in its fifth year. Vendors were asked to provide brief histories of their companies and describe how they had changed—both in the products they sell and in the machines and operating systems they support. Vendors also answered questions on how they think the Heath/Zenith community has changed in the past five years.

Needless to say, the responses to this survey varied greatly. While some companies have grown significantly, others have remained small, family businesses which one vendor called "basement operations." And while some companies have chosen to specialize in hardware, others specialize in software, or even in both.

However, perhaps even more interesting than the wide variety of responses to the survey were the similarities. In particular, all of the vendors who have survived the last five years have been successful in weathering a rapidly changing computer environment. In speculating as to how they did manage to survive, many of the vendors thought it was due to their ability to listen to user requests and adjust to them accordingly. In other words, these vendors have been willing to *adapt* to a rapidly changing industry and to its consumers.

A large number of the vendors who responded to the survey had remarkably similar attitudes toward the changes exhibited in the demands of the Heath/Zenith community. Whereas earlier users were typified as "hackers," current users seem to want machines that produce results without much effort on the part of the user. Matt Gray of Hilgraeve, Inc. seemed to sum up the thoughts of many of the vendors when he wrote, "While the core of the Heath/Zenith community—the kitbuilders, hackers, and hobbyists who were active five years ago—hasn't diminished in number or enthusiasm, Zenith's success in the federal, academic, and corporate markets has brought new members into the community and a shift in attitudes. Appreciation of technology for its own sake has faded; it's now seen as a means to an end."

Zenith's success has brought new members into the community and a shift in attitudes.

Of course, the kind of change described by Gray requires the vendors to stay constantly on their toes in order to keep ahead of their competitors. Many of those who started out supporting the H8 and H/Z89 are now also supporting the H/Z150 and other IBM compatibles. As far as operating systems are concerned, many vendors who did not support the Microsoft Disk Operating System (MS-DOS) in 1982 are now doing so.

Differing adaptations

Individually, of course, the vendors have each had their own unique experiences over the past five years. Hughes Hoyle of **Hoyle & Hoyle Software** runs his business by himself. He credits the durability of his company to the production of good software combined with the willingness to change his products according to his customers' needs. Hoyle & Hoyle still supports the H8 and the H/Z89 in addition to the H/Z100, and has now added the H/Z150 and other IBM compatibles to its list.

Hilgraeve, which currently produces the communications program HyperACCESS, has had an interesting history. Founded in 1979, the company's first product was an electronic bicycle speedometer. Later, Hilgraeve divided its business between developing metal-detection technology and its first communications program, ACCESS. HyperACCESS was developed in October 1985. Since selling its patent for the metal-detection device in 1986, Hilgraeve has concentrated more on its software business.

In 1982, Hilgraeve supported the H8, the H/Z89 and the H/Z100. Currently, Hilgraeve's software products work on most of the other Heath/Zenith machines and on IBM compatibles as well. As a result of the company's expansion into the IBM-compatible market, Hilgraeve's HyperACCESS has been recognized in *Software Digest* and in *PC Magazine*.

Hilgraeve, which started business "as two guys in 400 square feet of garage space," has expanded to the point where it now employs seven people.

Roy Reichert of **Reichert Digital Systems** told us that his company has concentrated on productivity applications and educational packages. "These have been developed," Reichert wrote, "so as to minimize hardware dependencies and allow easier upgrade within

Victoria Saxon keeps active in the Heath/Zenith community by attending local HUG conferences and using her Z100 for freelance writing.

the constraints of the target operating system."

Perhaps a key to the success of Reichert Digital Systems is its willingness to listen to its "potential customers" as well as its current customers. The company seems to take the fast changes of the Heath/Zenith community as an exciting challenge, and it supports Zenith's decision to enter the IBM PC-compatible market. Though, as Reichert wrote, the decision to make IBM clones "may seem like a step backwards in PC architecture," it still makes good "business sense" for Zenith and its vendors.

In 1982, **Studio Computers** was primarily a mail-order business that concentrated on selling computers (Z100s) and accessories. The mail-order business did so well that the company later opened a retail store. Although the retail business naturally dictated slightly higher prices for its products, Studio Computers enjoys the "more personalized service" they can now give their customers.

Studio Computers still has a mail-order catalogue (although in 1986 only 5% to 10% of its total sales were made by mail order). Whereas the catalogue was fairly "elaborate . . . in 1981 to 1986 with photographs, etc.," the company now sends out a less expensive catalogue that can be updated more frequently in order to keep abreast of the changing prices and products they offer.

Studio Computers is currently an authorized Zenith Service Center and sells Zenith computers. However, they also sell printers, accessory cards and software made by other companies. In 1982, Studio Computers supported the H8, H/Z89, and the H/Z100. The company currently supports almost all of the Heath/Zenith computers, including the IBM-compatibles.

Dave Brockman of **FBE Research** wrote, "FBE has gone from a one-man, part-time basement operation to a one-man, full-time, basement operation." Brockman, who supported the H88 and H/Z89 five years ago, now supports the H/Z100, '138, '148, and '150 as well. He also currently supports Z-DOS and MS-DOS in addition to the Heath Disk Operating System (HDOS) and CP/M he supported in 1982.

According to Brockman, the arrival of the Z100 precipitated a large expansion of the market for FBE. Sales are currently four times what they were at the company's inception.

However, Brockman did point out one drawback to the expansion of the Heath/Zenith computer industry: "The computers are getting better and more complete, so figuring out new add-ons or modifications is getting harder."

Steven Robbins wrote that his company, **S & K Technology**, is also still a small business. Robbins seems to like the small size because he can provide more support to his customers.

S & K Technology proved a die-hard supporter of the unique Heath/Zenith machines until it finally became apparent that Heath/Zenith was going to make all of its machines IBM-compatible. Since then, S & K Technology has converted WatchWord (its word-processing program) and Resident Speller to work on IBM-compatibles in addition to the Z100.

Tom Jorgenson, president of **Software Wizardry**, said that his company was incorporated in 1981. During that year, the company had three employees. Jorgenson wrote, "Dale [Wilson] brought approximately 10 years of experience in software development to our company, to join my 10 years of hardware expertise." This combination proved valuable in the computer market and undoubtedly contributed to their success in the business.

In 1984, with a newly expanded business, the company continued selling its own products under the name of "Software Wizardry" and opened a computer retail operation under the name of "First Capitol Computer."

Software Wizardry currently employs 15 people. Whereas the company originally sold mostly software, they now try to combine software and hardware in the products they sell. "In the future," Jorgenson wrote, "we will concentrate on relatively low-cost ($50-$500) products mixing circuit-card assemblies with either software or specialized system knowledge—and we will probably avoid pure software offerings entirely."

Like S & K Technology and others of the "original" Heath/Zenith vendors, Software Wizardry joined the IBM-compatible market only when it became apparent that Zenith was going to concentrate its computer production on IBM-compatibles. Software Wizardry still supports the H/Z89-90, but they concentrate much more heavily on IBM-compatibles now than in the past.

Jorgenson reports that the need for HDOS and CP/M support "has largely vanished," and Software Wizardry does most of its business with MS-DOS users.

The Software Toolworks was founded in 1980, and when the first issue of *Sex-*

A Perspective on the Microcomputer Market

There are a couple of other trends in the microcomputer market that bother me. They didn't fit into a blank on your survey, but here goes.

The microcomputer was born in the mid-1970s. Its fathers were the lone innovators and entrepreneurs with the vision and foresight to see what *could* be, rather than what is. Its mothers were the high-tech companies of Silicon Valley, that put American technology to work producing the microchips that became the body of the micro.

The corporate giants in the computer field had nothing to do with the birth of the micro. They lived in a secure world where only *they* could produce computers. Where marketing sold, rather than performance. Where users must buy or lease software with restrictive license agreements. Where progress was carefully limited lest it interfere with the sales of last year's model.

The micros changed all that. They were "open" systems that you could build and maintain yourself. Software became cheap and available; you could even write your own. Operating systems were generic, so you could add memory, printers, or disk drives to your heart's content. Prices fell drastically, and performance went up rapidly.

The giants finally realized that the micro was here to stay. So they decided that they must have the market for their own. They could not compete in technology; the micro manufacturers could produce a new product in three months that would take IBM three years. So they chose to use the weapons of their choice: money and marketing.

They have been very successful. The pioneers of the '70s have all been driven out or absorbed into Corporate America. Today's micros have gotten bigger, more complex, and more costly to get what is considered an "adequate" system. Software is often copy protected, and subject to restrictive license agreements. Copying has replaced innovation. Marketing hype has replaced facts and figures. Progress has nearly halted; just try to think of any significant new programs or hardware developments in the past year.

We have almost come full circle, and put control of computers right back into the hands of the giants. This is madness. The computer is not perfected; now is not the time to standardize design!

. . . [Zenith] can't compete with the marketing power and name recognition of IBM. And it can't compete in price with the off-shore manufacturers. Its only hope lies in innovation and progress.

—Lee Hart
Technical Micro Systems

tant was published in 1982, the company was doing a lot of business with Heathkit stores. Since Heath/Zenith developed IBM-compatible machines, The Software Toolworks has changed to "mass market software," and now provides software not only for most of the Heath/Zenith machines, but also for Apple, Commodore, Atari, and others.

Walt Bilofsky, founder of The Software Toolworks, still has a high regard for the Heath/Zenith community. His company continues to provide service to many of their original customers and still supports HDOS. Bilofsky commented that even though Heath/Zenith no longer sells the most exciting machines on the market (as it used to), it still has "the most innovative and forward-looking users."

SOLARSIM™

by James Tursa

The Solar System Simulation Program

SOLARSIM is a dynamic 3-D color graphics simulation of our solar system and nearby star systems. It simulates the planets, 250 asteroids and comets (including Halley's), and over 800 stars, nebula and galaxies (you can add more!). View and identify the stars and solar system from any point on Earth or nearly any point in space and at any specified time or date. Great for stellar navigation, tracking comets and planets, and learning the positions and shapes of the constellations. **SOLARSIM** comes with a high-quality 50-page manual. **SOLARSIM** (IBM© version) has both medium-resolution color and high-resolution single color modes.

Only $29.95 for a limited time!

(Please add $2 for shipping. Texas residents add sales tax. Overseas orders should add an extra $5

Available for the IBM PC/XT/PCjr/AT and compatibles, Zenith© Z-100, and the TI© Pro.

System Requirements:
128K RAM & Color/Graphics Adapter (IBM)
192K RAM (Z-100)
256K RAM (TI Pro)
DOS 2 or later (except Z-100)

Send check, money order or COD orders to CYGNUS, P.O. Box 57825, Webster, TX 77598, (713) 486-4163

Credit card orders only:
(800) 622-4070 (Nat'l)
(800) 942-7317 (ILL)

CYGNUS

Circle #137 on Reader Service Card

Generic Computer Products reported an approximately 40% annual increase in sales profits from its inception in 1981 through 1985. The company continues to have a high regard for HUGgies and thinks that they have a much stronger interest in the technical aspects of computers than do other users.

David Powers, president of Generic Computer Products, noted: "The main differences in the computer market over the last five years that we have noticed are a migration from CP/M-80 to MS-DOS and an elevation of customer expectations with regard to product quality and ease of use." As a result, his company has put a strong emphasis on improving the quality of the software packages they offer.

Responding for **T & E associates**, Tom Cauthen wrote that in 1982 his company supported HDOS, providing software and programming tools. Now, however, T & E associates is primarily a consulting firm that specializes in automatic data processing (ADP) systems and "high level language software development."

Cauthen expressed some disappointment in the changes undergone by the Heath/Zenith community and their machines. He wrote: "Zenith no longer provides a viable alternative to IBM or Apple."

Pat Diehl of **Kres Engineering** expressed a similar feeling of disenchantment. Kres has changed from being primarily a supporter of Heathkit computers to a firm that provides consulting and contract manufacturing and that is "now less dependent on Zenith products."

Although the people at Kres continue to have a strong feeling of attachment to the original HUGgies, they feel that much of the spirit of five years ago has disappeared. At the 1985 CHUG conference, the Kres booth was the victim of two thefts, and at the 1986 WRHUGCON in California two of their brand-new Z171s were stolen.

Diehl wrote that Kres continues to support Zenith products, and noted that they have a kit to convert the Z100 into a transportable. However, Diehl went on to say that, "faced with an ever-shrinking market (dedicated solely to Heath/Zenith) and a lessening of respect from some of the new users, any smart business must seriously evaluate future commitments of capital to this market."

Lindley Systems' Robert Lindley wrote to tell us that his company was founded in 1980 and, at that time, it provided software support to Heath computer users who wished to interface their computers to a variety of different printers. Later, the company expanded to provide hardware services as well. Lindley Systems continues to provide products specifically for the Heath/Zenith community, even though they feel that Heath/Zenith no longer provides the technically superior machines it used to.

Steve Hesterman of **Zeducorp** said that his company had just one piece of software to offer back in 1982. He is pleased that Heath/Zenith has taken the direction it has in the computer industry, and he feels that Zenith's government contracts have served as a base from which Zenith can prove its machines' superiority over IBM PCs and compatibles. Zenith's advancements have improved his company's business. Zeducorp now makes products for the IBM-compatible Zenith computers. These products include custom data base, multi-user, and local-area network systems.

Make QUERY III your key to a world of information...

Finally, a database management system you don't have to go to school to learn how to use.

Our system is so easy to use, you'll be up and running 10 minutes after you open the package. It's so versatile you'll never outgrow it. QUERY III is written in assembly language for super fast sorts and searches, and it's written with the user in mind, with lots of help menus and safety features built in. Eleven programs provide all your fundamental needs: Create, Add, View, Sort, Search, Printer, Writer, Redesign, Purge, Recover, and Autopro.

QUERY III user, Nat Sherrill of Sherrill Cellars, in Remark, October '85, says: "Might I suggest QUERY III published by Hoyle & Hoyle. For just $100, you get an extraordinarily well developed package of routines that easily match the performance of the over-advertised, over-priced and under-performance "hot-stuff" we always read about."

Hoyle & Hoyle
Software, Inc.
111 Sparrow Drive
Isle of Palms, SC 29451
(803) 886-5802

Available in HDOS, CP/M, MS-DOS, Z-DOS, PC-DOS.
Order now or write for further information about QUERY III and support software.
$99.95 Visa, MC, Choice, COD, or check. Shipped next working day.

Circle #113 on Reader Service Card

SEXTANT BACK ISSUES

$3.50 each

Order now and complete your Sextant library!

Name _____

Address _____

_____

_____

Check off issue numbers desired:

☐ #1	☐ #11	☐ #20
☐ #2	☐ #12	☐ #21
☐ #3	☐ #13	☐ #22
☐ #4	☐ #14	☐ #23
☐ #5	☐ #15	☐ #24
☐ #6	☐ #16	☐ #25
☐ #7	☐ #17	☐ #26
☐ #8	☐ #18	
☐ #10	☐ #19	

_____ issues @ $3.50 ea. = $_____
(Please include $1.50 extra for each issue mailed overseas.)

☐ Payment enclosed (Checks must be in U.S. dollars payable on a U.S. bank.)

☐ Charge my ☐ Visa ☐ MasterCard

Card # _____

Exp. date _____

Send today to: Sextant, *716 E Street S.E., Washington, DC 20003.*

SEXTANT BACK ISSUES

$3.50 each

Order now and complete your Sextant library!

Name _____

Address _____

_____

_____

Check off issue numbers desired:

☐ #1	☐ #11	☐ #20
☐ #2	☐ #12	☐ #21
☐ #3	☐ #13	☐ #22
☐ #4	☐ #14	☐ #23
☐ #5	☐ #15	☐ #24
☐ #6	☐ #16	☐ #25
☐ #7	☐ #17	☐ #26
☐ #8	☐ #18	
☐ #10	☐ #19	

_____ issues @ $3.50 ea. = $_____
(Please include $1.50 extra for each issue mailed overseas.)

☐ Payment enclosed (Checks must be in U.S. dollars payable on a U.S. bank.)

☐ Charge my ☐ Visa ☐ MasterCard

Card # _____

Exp. date _____

Send today to: Sextant, *716 E Street S.E., Washington, DC 20003.*

Sextant back issues are available for $3.50 each. Each issue is filled with information about your Heath/Zenith computer:

- programs for all Heath/Zenith machines
- hardware modifications
- hardware reviews
- software reviews
- Heath/Zenith-related news

Every *Sextant* issue is a valuable reference book for *all* Heath/Zenith users. Send in this card with your order today.

S27-BI

Sextant back issues are available for $3.50 each. Each issue is filled with information about your Heath/Zenith computer:

- programs for all Heath/Zenith machines
- hardware modifications
- hardware reviews
- software reviews
- Heath/Zenith-related news

Every *Sextant* issue is a valuable reference book for *all* Heath/Zenith users. Send in this card with your order today.

S27-BI

SEXTANT BACK ISSUES

#1 SPRING 1982
A Parallel Interface for the '89
Disk Programming Without HDOS
Print Spoolers

#2 SUMMER 1982
Crucial Secrets of HDOS
Preview of the Z100
Structure in BASIC Programming

#3 FALL 1982
The World's Fastest Sort?
Give Your '89 an Automatic Boot
Graphics on Your H8

#4 WINTER 1983
HDOS Interrupt Programming
Eight Spreadsheets Compared
Beyond the H/Z Disk Controller

#5 SPRING 1983
CP/M: The First 13 System Calls
Understanding HDOS
Improve Your H8: Add a Fan

#6 SUMMER 1983
Pascal Elucidated
Assembly Language In a Spooler
Passwords and Record-Keeping

#7 FALL 1983
Z100 Software Roundup
Make Your '8 Think Like an '89
dBASE II Comes to Heath/Zenith

#8 WINTER 1984
Games Roundup
Z-DOS Assembly Language
Kids and Computers

#10 MAY-JUNE 1984
Microsoft Windows
Color Graphics for your '8 or '89
Put an Electronic Disk into Your H8

#11 JULY-AUGUST 1984
Review of the Z150
Introduction to Pascal: Part 1
Inexpensive Letter-Quality Printers

#12 SEPT.-OCT. 1984
Z-DOS Communications Software
Introduction to Pascal: Part 2
The HUG Bulletin Board

#13 NOV.-DEC. 1984
A Parallel Port on Your '89
Introduction to Pascal: Part 3
Making Z-BASIC Friendlier

#14 JAN.-FEB. 1985
Microsoft Word and Mouse
Grafting an 8086 Onto the '89
WatchWord for the Z100

#15 MARCH-APRIL 1985
Teach Your Z100 Greek
Graphs on the '100 and '150
HDOS Command Processing

#16 MAY-JUNE 1985
Great Graphics on the '19 and '89
Speed Up Your '100 50%
A Critical Look at the 8088

#17 JULY-AUGUST 1985
Moving Up to MS-DOS 2
Auto Key Repeat for the '89 or '19
Affordable Graphics for the Z100

#18 SEPT.-OCT. 1985
The Ultimate Word Processor?
Menu Control with HDOS MBASIC
'89 Interactive Graphics Controller

#19 NOV.-DEC. 1985
Speeding Up the Z100
HDOS Enhancements
S-100 Modem Upgrade

#20 JAN.-FEB. 1986
Five Desktop Utilities for the Z100
Index to *Sextant* #1-#20
Customizing muLisp for '89 or '100

#21 MARCH-APRIL 1986
8087 Math Chip Speeds Up '100
Using PROMPT on the '100 and '150
See Seven Sorts

#22 MAY-JUNE 1986
ZCLK for the Z100
Run CP/M under MS-DOS
'100 and '150 Monitor Routines

#23 JULY-AUGUST 1986
BASIC Fractals
1216K of RAM for Your '151
A Low-Budget HDOS Data Base

#24 SEPT.-OCT. 1986
The Z150 and Gate Arrays
Subconscious Memory of the Z100
Print Big in BASIC (or Turbo Pascal)

#25 NOV.-DEC. 1986
Turbo Pascal
An MBASIC Simulation
Upgrade the ZVM-134 to 16 Colors

#26 JAN.-FEB. 1987
MS-DOS Programmer's Utility Pack
Winning Fractals
Four Upgrades for the '89

Complete your *Sextant* library by ordering missing back issues—don't miss any valuable information for your Heath/Zenith system!

$3.50 each

Send me *Sextant* issues:

☐ #1 ☐ #2 ☐ #3 ☐ #4 ☐ #5 ☐ #6 ☐ #7 ☐ #8 ☐ #10
☐ #11 ☐ #12 ☐ #13 ☐ #14 ☐ #15 ☐ #16 ☐ #17 ☐ #18 ☐ #19
☐ #20 ☐ #21 ☐ #22 ☐ #23 ☐ #24 ☐ #25 ☐ #26

_____ issues @ $3.50 ea. = $ _____
(Please include $1.50 extra for each issue mailed overseas.)

☐ Payment enclosed (checks must be in U.S. dollars payable on a U.S. bank)

☐ Charge my ☐ Visa ☐ MasterCard

Card # _____

Exp. date _____

Name _____

Address _____

_____

_____

Clip coupon and send today to:
Sextant
Dept. S27
716 E Street, SE
Washington, DC 20003

Bold, Stylish Text for H-19 and H-89!

T-Prom provides an entirely new look

for your CRT display. All of the text characters are enhanced for greater style, clarity and boldness. Now you have a choice between "stick" letters and clear, stylish screen text.

T-Prom is a plug-in replacement for the original character generator ROM, and is priced at only $19.95 including shipping, documentation, and installation instructions. (Another new product, **GT-Prom** offers the combined benefits of T-Prom and G-Prom for only $24.95. Write for information on G-Prom.)

Send your order to:

NORCOM
9630 Hayes
Overland Park, KS 66212

Circle #163 on Reader Service Card

Quality '89

Enhancements Still Available.

MAGNet local area network connects Z89s, Z100s, and PCs!

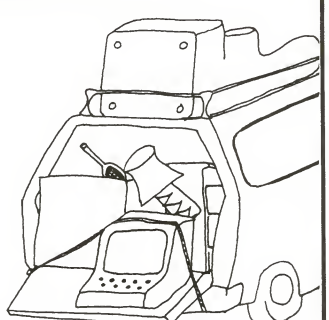
MAGNOLIA MICROSYSTEMS

2820 Thorndyke Avenue West
Seattle, WA 98199
(206) 285-7266

Circle #134 on Reader Service Card

MOVING? Don't lose your next issue of ***Sextant*** *in the shuffle.*

Send your Change of Address to:
Sextant
Attn: Circulation Department
716 E Street, S.E.
Washington, DC 20003



Clay Montgomery formed his company, **SigmaSoft and Systems**, in 1981, while he was still a student. When SigmaSoft first advertised in *Sextant* in 1982, the company offered two upgrade boards for the H/Z89 computer: the SigmaSound board, which generated music and sound effects; and the Universal Parallel Interface, which allowed printers and other devices to be connected to the H/Z89.

Today, Montgomery reports, his company has two full-time employees and several part-time employees. SigmaSoft still provides support exclusively to H/Z89 and H8 users. Montgomery even gets referrals from the Heath Company, since SigmaSoft is one of the few vendors who still provide support for these early Heath computers.

New Orleans General Data Services (NOGDS) is more than twice as old as *Sextant*. The company was founded as a software consulting firm in 1975 by Dave and Jean Troendle. By 1982, NOGDS had developed the HA89-3, a color graphics board for the H89 which offered an optional voice synthesizer, arithmetic processor and digital/analog converters. (Previously, NOGDS had sold their products, including a color graphics board for the H8, through the Heath Company.) Since then, NOGDS has gone on to help create many more graphics packages, including Z-Graph-100 (for the Z100) and later Flexi-Graph. (Flexi-Graph looks like Z-Graph-100 to the user, but it had been entirely redesigned internally to fit a number of different hardware environments.)

NOGDS has been around so long that, according to Jean Troendle, the company "has developed and manufactured hardware and/or software for every computer which has been put out by Heath and Zenith." NOGDS plans to continue this support of Heath/Zenith computers, although, of course, their future plans will be determined by a combination of customer requests and the hardware needs of new machines.

Controlled Data Recording Systems (C.D.R.) is primarily a hardware dealer. The company was founded in 1978 by Herm and Marc Brooks. In his response, Marc Brooks said that by 1982, C.D.R. Systems was dealing mostly with H/Z89-90 computers and was "just looking into the Z100 computers." Since then, their customers have changed and their business has grown. C.D.R. Systems now employs five full-time employees and five part-time employees. They currently sell a number of products for the Z100 (including a speed module and SCSI-based hard-disk systems), and hope to continue designing new products for the Heath/Zenith community.

Technical Micro Systems (TMSI), an engineering and consulting firm, provides support for the H8, H88 and H/Z89. Lee Hart wrote that his company's products have not changed much over the years because, in his own words, "we stubbornly remained neutral in the 'clone wars.'" Hart noted sadly that he thinks Zenith is making a mistake by trying to clone IBM computers: "The computer is not perfected; now is not the time to standardize design!" (For more of Hart's comments, see "A Perspective on the Microcomputer Market," accompanying this article.) He added that there have been improvements in memory capacity, disk storage and software quality over the past five years.

Ken Kaplan of **Arkay Engravers** had a somewhat unusual response to *Sextant*'s survey. He wrote: "We have actually stayed exactly the same." Arkay Engravers makes custom-engraved keycaps for computer keyboards. The only change Kaplan noted in his products is that Arkay is currently producing keycap molds for the Z100 series keyboards.

Magnolia Microsystems had three employees in a 1,000-square-foot office space when it was founded in 1978. By the time the company began advertising with *Sextant* in 1982, it had 5,000 square feet of office space, fifteen employees, and boasted a figure of $1,300,000 in gross sales. Since then, the company has returned to its original size of three employees. In his response to us, Brad Gjerding of Magnolia wrote that his company no longer deals exclusively with Heath/Zenith computers. One of their products, MAGNet, supports all IEEE-696 and IBM PC bus machines, including the Z100 and Z150. Magnolia provides mostly local customers "with complete business solutions."

Secured Computer Systems continues to provide many of the same products and services it did in 1980. This includes consulting, system integration, system upgrading, custom software, and custom systems. However, the company has adjusted to the computer market as it has changed over the past several years. In general, today's computers need fewer upgrades. As a result, Secured Computer Systems has decided to concentrate more heavily on software and external box development than on the "more exotic changes" they might have considered for the older computers.

Jim Teixeira from **SoftShop** reported that he has been "phasing out of the software business over the past four years," and noted that business was best for him during 1980-1983. He upgraded his software to work on the Z100 (under Z-DOS), but since then, he has added no new products. The SoftShop offers device drivers, system enhancements, and educational software for the H8, H88, H/Z89 and H/Z100.

In 1982, **Newline Software** sold software for the H8, H/Z89 and H/Z100. Now, in addition to software, Newline offers hardware and other computer

supplies. The company currently supports computers that run Z-DOS and MS-DOS.

Mark Wolinsky told an interesting story about how he started **Floppy Disk Services** back in 1979. Wolinsky was working for the CBS television network as a technical director when the station decided to upgrade its studios by installing computerized video equipment. Wolinsky became so fascinated by the new computer systems that he decided to start his own business selling computer peripherals. Thus, in May 1979, Floppy Disk Services was born. By July 1982, Wolinsky was able to quit his job at CBS in order to devote full time to his flourishing company. Since then, Floppy Disk Services has provided computer peripherals for many different kinds of computers and operating systems. They offer support for most Heath/Zenith computers and consider Heath/Zenith users to be among their "most valued customers."

Charles Porter of **Payload Computer Services** has a high regard for Zenith quality. He wrote, "Zenith continues to provide superior hardware. . . ." He added, however: "We have seen a serious drop-off in the Heath technical support."

The first products Porter offered to his customers were enhancements to the H89. These included disk drives and printers. Since then, Payload Computer Services has quadrupled the size of its office space and now offers "a complete line of Zenith computers and support products including software."

Despite its success, Payload Computer Services remains a mail-order business run by the Porter family. They work hard to react to a fast-moving market while maintaining the quality of the products they offer.

Jay Gold Software offers only one product, the Home Finance System. Originally, the Home Finance System worked on HDOS and CP/M, but soon version III will be ready for MS-DOS. A self-described "small vendor," Jay Gold Software is a mail-order business. When asked to describe his thoughts about the Heath/Zenith community, Gold commented that Heath has provided a good environment for learning about computers. He considers this unique in the computer world.

J. C. Hassall, of **H & H Computer Enterprises**, wrote that he started developing hardware and software when his H89 required interfacing to a board he had built to program programmable read-only memory (PROM) chips. After designing his own serial/parallel interface board for the '89 and some software to accompany it, Hassall discussed the theory and use of that package in the first issue of *Sextant*. Since then, Hassall has been advertising his products and periodically writing articles for the magazine.

Hassall believes that the computer industry has been overwhelmed by IBM's takeover of the market. He also warned that software theft had moved into the Heath/Zenith marketplace. He still has a high regard for the "cohesive" Heath community, however, and he thinks that "the popularity of Heath computers opened the eyes of IBM to the personal computer market."

Survivors all

Needless to say, the vendors who advertised with *Sextant* for its first five years are a somewhat eclectic group. If they have anything in common, it is perhaps their instinct for survival.

The microcomputer industry in general has changed tremendously over the past several years, and the Heath/Zenith community has gone through its own particular changes. The home-made Heath computers of several years ago are now being replaced by IBM-compatibles and laptop portables. Hardware and software hackers are now sharing space with people who simply want efficient, "hassle-free" programs.

Somehow, despite these changes, the vendors described in this article have managed to stay in business and even flourish. Whether they did it out of respect for the original hackers, the excitement of an ever-changing environment, or simply out of love for computers, they fought the odds and won. △

DATA SWITCHES CENTRONICS or RS-232 4 PORT ABCD $39.95 2+$36.95
CABLES 6ft $12.95 10ft $14.95
BULK JVC DSDD Soft Sector 25-16.50 50-$ 32 100-$ 60
BULK JVC HI DENS 10-$16 20-$30
Nashua SSDD 10 Sector $ 7.80
Nashua DSDD $ 8.25 5+ $ 7.90
Soft or 10 Sector on Nashua
BASF DSDD $ 9.90 5+ $ 9.65
XIDEX DSDD $ 6.75 5+ $ 6.50
MAXELL DSDD $11.90 5+ $10.80
MAXELL HD $24.95 5+ $23.95
SONY HD $24.95 5+ $23.95
BROWN DS96tpi $ 18 5+ $17.00
SONY DS 3.5"$22.50 5+ $21.75
MAXELL DS 3.5"$22.50 5+ $21.75
GEMINI 5" Head cleaner single-disk wet system $ 5.95
6 OUTLET STRIP/Surge sup.$16.95
DISK STORAGE
Ringking 8" w lock $28.95
Flip n File 8" holds 50 $26.95
Media Mate 5" holds 50 $ 9.95
DX-100 wlock nesting lid $ 9.95
DX-100B wlock 50 ea side $12.95
DF120 hinged lid 120 cap.$11.95
RIBBONS!! call for other types!
Brother 1509 $11.95
Brother 15/25 film/nylon 4.95
OKI brand 182/193 etc 8.25
OKI 82/83 etc.$1.50ea 12/$15.00
EPSON MX-80 $ 2.95
EPSON MX-100 $ 4.50
IBM ProPrinter $ 5.95
Diablo Hytype nylon or MS$ 3.50
TERMS:Check or money order! Add $ 1.50 per order S&H, 48 States N.Y. & NJ. Res.add Sales Tax!!!

BROTHER M-1509 PRINTER 180cps $ 379.95 + $ 5.00 S&H
FONT BUFFER (16K) BOARD $ 89,CUT SHEET FEEDER $ 129

MATCOMM
P.O.BOX 604,BRONX,NY 10469
(212) 652-2053 until 11 PM

Circle #192 on Reader Service Card

ENJOY YOUR CP/M COMPUTER AGAIN

CompuMagic's put 20 programs into one super CP/M Utility Package. No fancy menus; No flashy graphics; Just flexible, fast, hard working programs that do what you want them to do.

Utility programs aren't sexy, but these programs have a way of making even dull tasks like file copying, renaming, sorting, and even erasing so much easier that it's almost exciting. Directory listings, turnkey program starters, screen capture and more. The programs are described in detail in the more than 50 pages of documentation. Order it now and start enjoying your CP/M computer again. Only **$45.**

30-DAY MONEY-BACK GUARANTEE. All CompuMagic products are fully functional and fully supported, and come with a full, 30-day, money-back guarantee.

ORDER NOW: Send Check or MO (Personal checks accepted) or call with your MC, Visa, or COD order. NO charge for UPS ground shipping. Add $2 for UPS COD and $5 for foreign orders. (MD Res. add 5% tax.) Available in 5" Hard Sector and 5" and 8" Soft Sector Formats. Be sure to specify what you need.

CompuMagic, Inc.™
P.O. Box 437
Severn, MD 21144
(301) 969-8068

Circle #156 on Reader Service Card

Checking Up on the Charter Subscribers

They've subscribed to Sextant *since March 1982. What do they think about what's happened since then?*

John Gill

Hell hath no fury like a user scorned. That's certainly clear from the survey we recently conducted of our charter subscribers, as part of *Sextant*'s fifth anniversary celebration. We asked our readers to comment on changes they've seen in the Heath/Zenith community over the past five years—and they had a lot to say.

On December 5, 1986, we mailed out approximately 1,400 questionnaires to current subscribers we'd identified as having started their subscriptions in March of 1982 with *Sextant*'s first issue. By the end of the month, we'd gotten back more than 400 replies. That's a pretty good response rate.

What motivated many of those who completed the questionnaire was the chance to bemoan the lack of support for their systems. One writer remarked he felt better for having vented his anger toward Heath and Zenith in the process of filling out his survey form.

Of course, not all of the responses were negative. Occasionally a reader would applaud Zenith for embracing IBM compatibility. This was the exception, however. Disappointment was the rule.

While there's no denying the strong sentiments of these readers regarding Heath/Zenith, it's important to keep their comments in perspective. The people we surveyed were charter subscribers, who almost universally were using 8-bit machines five years ago. The majority of readers who returned questionnaires have, in fact, remained loyal to their H8s and H/Z89s. Although some have since acquired '100s or Heath/Zenith IBM compatibles, for the most part they did so grudgingly.

There's a lot of potential for feelings of abandonment among this group of subscribers. They've watched Heath and Zenith drop support for their systems in favor of jumping on the IBM bandwagon. To add insult to injury, most of our respondents consider Zenith's IBM-compatible computers to be a step backwards from the pioneering efforts that produced the '8, '89, and '100.

What a difference five years made

Most of our readers five years ago were using '8s and '89s that they'd built themselves. Many were just getting to know their computers. They were exploring their machines' capabilities, inside and out. Tinkering with the inner workings of their systems was part of the fun. Indeed, many of our charter subscribers say they first bought their systems simply so they could learn about computers—they had no particular applications in mind.

> ***Tinkering with the inner workings of their systems was part of the fun.***

That points up one of the big changes our readers saw over the past five years in both the Heath/Zenith community and in the computers being used. The "hacker" orientation has been fading, as more people are buying computers in order to perform specific tasks. Commented James W. Moss of Seattle, "Computers are no longer a hobby; they are simply tools to help with my work. I knew a lot about the insides of my H89, and what I didn't know I could find out by rereading the manuals. I don't know anything about the insides of my Z248—and I don't have a manual."

Five years ago the most common application for our readers' computers was word processing, particularly using PIE and TEXT from The Software Toolworks. Five years later, word processing is still the most common application. What has changed are the other uses people have found for their machines; and in many cases, the machines themselves.

Spreadsheets, data base programs, graphics, games, communications programs—all are widely used now. To take advantage of these applications, most users have upgraded their 8-bit systems. Popular enhancements include expanded memory, additional drives, 4-MHz speed-up mods, real-time clocks, graphics boards, and modems. These upgrades didn't come cheap, and therein lies another sore point with many charter subscribers. They've invested a tremendous amount of money in their systems, and don't want to see support for them dry up.

This quandary was expressed by Steve B. Peterson of Poulsbo, Washington, who said, "I spent $3,500 in '80-'81 for the 'ideal' system, only to watch it become obsolete before three years had passed. I've picked my plateau to stay on, for now, but today's software has so much more to offer, even with the limits of IBM's strangling design. My H89 still works great, though. Why should I reinvest? As for Heath/Zenith? Awk—they're selling Apples now!"

The question of when enough is enough is one that most users of older machines must grapple with. No one wants to "throw good money after bad." But when have you reached that point?

John Gill is Sextant*'s assistant publisher. During the past three years, he has been actively involved in circulation and subscriber services.*

-- SHIPPING NOW -- SHIPPING NOW -- SHIPPING NOW --

WILDFIRE

An INCREDIBLE PERFORMANCE IMPROVEMENT from Software Wizardry

SPEED... WILDFIRE has spirit. It will spur your Z-151 or Z-161* to run faster than the 8mHz Z-158! And WILDFIRE isn't just a simple crystal change like some products; it gives you more speed and much greater compatibility.

COMPATIBILITY... WILDFIRE uses the NEC V-20 chip plus lots of other enhancements to make an unbeatable combination of performance and reliability. It outdoes the 80286 processor chip additions for compatibility with the IBM PC and costs up to $600.00 less!

FEATURES... the heart of WILDFIRE is a daughter board that mounts on your processor board, saddled comfortably between it and the video board. Several higher-speed chips are included to replace socketed chips on your processor board. A high speed/low speed switch that mounts on your machine's front panel keeps WILDFIRE on a tight rein, under your control to trot at normal speed, or break into a real gallop when you really want to ride!

PRICE... Software Wizardry brings you WILDFIRE, complete with attractive front panel, installation instructions, and reliable daughter-board design, for only $249!

●●● 15-DAY MONEY-BACK GUARANTEE! ●●●

If you order now, you can try WILDFIRE with a 15-day money-back guarantee! If you don't like it, you can return it within 15 days and get a full refund!

WILDFIRE...the ultimate solution to your speed problems. And with our special low price, AND our 15-day money-back guarantee, you can't go wrong! Order now!

Contact your local dealer, or order direct from Software Wizardry by calling (314)724-1738. Dealer inquiries invited.

Software Wizardry

1106 First Capitol Drive
St. Charles, MO 63301
(314)724-1738

Circle #204 on Reader Service Card

One subscriber felt he already had. Rather than make any further modifications to his H89, he bought a non-Zenith IBM compatible. Said he, "A clone machine and hard disk and software cost less than an H89 hard-disk upgrade!" On the other hand, most of the software that users have acquired over the years for the H8 and H/Z89 won't run on the IBM clones. So the inconvenience of leaving all of that behind and becoming familiar with new programs must be factored into the equation—not to mention the sticky question of how to transfer one's data from an 8-bit system to an IBM clone. It's a dilemma.

Trailblazers—and die-hards

The reluctance of some H8 and H/Z89 users to get newer systems is, in some ways, a paradox. These same users were among the first people to buy *any* brand of personal computer; more daringly, most had the audacious idea of putting it in their home. This may seem pretty routine today, but five or more years ago it was an adventurous road to follow.

These people—the "early adopters" of new technology, who have long been the nucleus of Heath Company customers—have now drawn the line at the H/Z150 series of IBM-PC compatible computers. The unwillingness of some of these early subscribers to buy the newer machines is reinforced by the sense of loss they feel as members of what was previously a close-knit community—the thrill is gone. Says Gary Jewell of Falls Church, Virginia, "The users have transitioned from the one-brand, intensely-loyal, hobbyist, hardware-knowledgeable experimenters to several groups—government (mostly Department of Defense), and name-brand clone owners. They're far less hardware knowledgeable; often with a business job to do, they're perhaps less resourceful and often more demanding of user-friendly features. They are also less clubby, and exchange less information and help each other less."

Just as the users have changed, so have Heath and Zenith. Notes Earl L. Albin of Valley Station, Kentucky, "It appears that Heath/Zenith is getting away from the hobby type of computing. Our local Heath/Zenith Electronics Center looks more like an Apple computer dealer! They were not sure what a 10-hard-sector disk was."

Facing reality

Times *have* changed. Whether it's been for the better or for the worse seems to depend on when you bought your computer, and which computer you bought. While there is justification for much of the ill feeling toward Heath/Zenith of many charter subscribers, there is the quintessential other side of the coin. If Zenith hadn't embraced IBM compatibility, would it still be in the computer business today? Many people would say no. Some companies that were contemptuous of Big Blue haven't lived to tell about it; Zenith is still around. (In fact, many of the companies that went ahead and *did* embrace IBM compatibility have disappeared, too.)

A few of the people returning our survey viewed the changes in the computer industry philosophically. They weren't happy about the dominance of IBM in the marketplace, but they realized they couldn't do anything about it either. If nothing else, having one dominant player in the field has produced a wealth of software, and that's a benefit. Richard Sheeres of Council Bluffs, Iowa, started out with an H89, moved up to a Z120, and now also has an H148. He said, "I considered either the UCI or Gemini IBM modifications [boards that allow the Z100 to run IBM-PC compatible software], but spent a few dollars more and got an H148 for true compatibility. . . . I applaud IBM for bringing a standard (even if it's inferior to my '120) and competition to the marketplace. I paid $1,000 for a Winchester controller and 10-meg drive for my Z120. I'll pay maybe one-third of that for a generic drive for my H148."

Even more enthusiastic was Gregory Ramsdell of Ontario, California, who said, "The switch to PC-compatible computers was a very good move. I think the Heath/Zenith machines are much better than IBM or other compatibles. If Heath/Zenith had not released a PC-compatible line, I would have been forced to go with another brand."

That points out one unavoidable fact of computer life: IBM is everywhere. Even among those charter subscribers who professed to abhor the influence of IBM were many who admitted they had to use IBMs or IBM clones in their jobs. And for those who are in the habit of bringing work home, that meant an IBM compatible would eventually find its way into their house. This is how R. J. Crayton of Rochester, New York, who has gone from an H8 five years ago to an H158 today, put it: "IBM compatibility has become *mandatory* in *most* situations. The reluctance of many in the Heath/Zenith community to deal with that fact without feeling as though they just fell into the gutter is stupid! Purity may be one thing, but many of us are trying to get a job done with these machines with as much ease as possible—that's a Heath/Zenith IBM-compatible's virtue!"

Other concerns

Although the issue of IBM compatibility dominated the responses we got to our survey, other points were raised as well. Foremost among these was the question of *cost*. Many readers felt Zenith was pricing itself out of the market, or rather, pricing *consumers* out of the market. One subscriber commented, "The people who have supported Heathkit and to a lesser extent Zenith through the infancy of computers have not really benefited from their loyalty. Check the prices in the current catalogue. Corporate accounts and the government get to buy from Zenith at substantial discount. As a government employee I bought my Z100 for about 50% of the retail price at the time of purchase. I buy memory chips for one-fifth the price in the catalogue."

Luckily, many subscribers noted, there are third-party vendors supporting their systems that they can turn to. Although the number of companies offering products for the H8 and H/Z89 does shrink each year, there are still a number of them out there. The situation is even better for '100 users, and for '150 users

Circle Reader Service No. 161 to Participate in Sextant's *Next Reader Survey*

This September marks the tenth anniversary of Heath/Zenith computers. *Sextant* will be celebrating the event in our September-October 1987 issue.

We invite you to join in by participating in a survey similar to the one we conducted for this issue's special anniversary section. If you'd like to participate in our survey, circle number 161 on the Reader Service Card between pages 78 and 79 of this issue, fill in your name and address, and drop it in the mail.

it's fat city.

Another concern of charter subscribers was brought home in the comments of Parks Watson of Richmond, Virginia, who said, "I'm grateful to the independents who still support the '89 and HDOS. . . . Support from any source is important to me. I appreciate the occasional crumbs in *Sextant*." Well Mr. Watson, thank you, I guess.

The decision of how much coverage to give to each machine or operating system has long been an issue here at *Sextant*. Three years ago there was a furor among our readers over whether we were going to drop coverage of the '8 and '89 in favor of the newer '100. Last year, the same controversy surfaced regarding the '150. We intend to support *all* Heath/Zenith systems, new and old. To a very large degree, what's covered in *Sextant* is determined by the interests of our readers, since we depend on them to write most of our articles.

Many *Sextant* subscribers now *do* use '150s, and they've encouraged us to expand our coverage of their computers. We intend to do this, while still supporting the '8, '89, and '100, which are dear to the hearts of many of our longer-term subscribers.

Five years ago when virtually all our readers were using 8-bit systems, just about every article was useful—or at least interesting—to just about every reader. That's no longer the case. As our readership has grown to include people with newer Heath/Zenith machines and operating systems, we've tried to include articles of interest to each of them. Inevitably, this means that every article is no longer going to be of interest to every reader. Even so, it is our goal to have something in each issue that is useful to every Heath/Zenith user.

One way we're trying to ensure continued attention to the older machines is through our regular columns, such as "The Eight-Bit World" and "Z100 Notebook." Both of these features were praised by many of our survey respondents. Other articles of interest to '8, '89, and '100 users will continue to appear in *Sextant* as long as our readers—who are also our authors—continue to write them. And, as more *Sextant* readers acquire newer Heath/Zenith machines, we're looking to increase the number of articles in *Sextant* about the IBM-compatibles.

Letting off steam

The overwhelming sentiment expressed by our charter subscribers was frustration, mixed with pride. Those who are still using their '8s and '89s don't want to be left behind, but they don't want to give up the systems they have now—which they feel are the best. It's hard to convey how strongly attached they are to their computers. They built them. They upgraded them. In many cases, they wrote the software that runs on them. Said one subscriber, "As far as I'm concerned, the H8/H89 and HDOS are the *standard* and IBM is not compatible! Eat your heart out, IBM!"

On the other hand, another subscriber was not so sanguine. Said he, "I used to laugh at those who thought the H8 was being ignored. I'm no longer laughing!" For some readers, the change in the community was disheartening. "The Heath offerings seem to be moving to 'appliance operators,' as opposed to kit-builders or creative/inventive persons," commented one.

The temperament of many of the responses to our survey was decidedly negative. Many of our readers had an ax to grind with Heath/Zenith, and by the time they'd finished their questionnaires, they'd gotten the edge nice and sharp. Still, many had a sense of humor about their predicament. Said M. C. Martin of Palo Alto, California, "I am 72 years old and my H8 system suits me fine. It will last as long as I do."

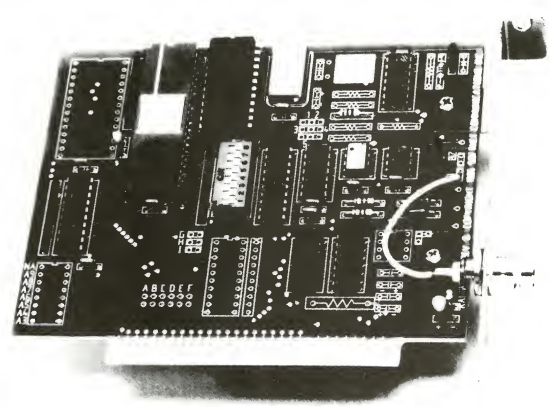
The fact that so many charter subscribers took the time to respond to our survey indicates their continued commitment to their Heath/Zenith computers. For users of these older Heath/Zenith systems who now feel they're stuck between a rock and a hard place, the computer industry may seem like a modern-day version of the "state of nature" Hobbes described two hundred years ago. Only the strong survive. The H8 and H/Z89 are still around today. There may be a conclusion to be drawn from that. △

ViaNet® & KAL1000™
Local Area Network

Combined to offer you the most cost effective and flexible solution to Local Area Network your IBM® PC/AT's, compatibles and Zenith Z100 systems.

KAL1000 Adapters plug into any available slot and are connected via an RG-58 coaxial cable and BNC connectors. The cable can be as long as 10,000 feet and up to 254 logical users can be networked. KAL1000 uses a 2 Mega bits/sec baseband signal and a unique CSMA/CA/CD/PA network access method which combines both Token and CSMA systems to provide extremely reliable and efficient communication. The adapter uses less than one Watt of power and is complemented with a semi-custom gatearray chip for increased reliability.

ViaNet LAN File Server software is a Unix-like extension to MSDOS® which provides a fully distributed peer-to-peer network operating system. ViaNet is a **serverless** system and all resources on the network nodes may be optionally shared through the extended MSDOS hierarchical file structure. Redirection of requests is completely transparent to users. ViaNet provides full resource and data security for Owner, Groups of Users and All Users via passwords. File and record locking is supported under MSDOS 3.1. Compatible to DBASE-III Plus, Lotus, Multiplan, WordStar, RBase 5000, Word Perfect, ... etc. Also includes a full featured print server which also operates in background.



Complete Price **$395.00** (with IBMPC adapter)
$445.00 (with Z100 adapter)

SoftNet

SoftNet Communication, Inc.
15 Hillcrest Drive, Great Neck, NY 11021
(516) 829-6536 TLX 650-309-6952 MCI UW

KAL1000/TM SoftNet Communication, Inc., ViaNet/Registered TM ViaNetix., IBM/Registered TM International Business Machines., MSDOS/Registered TM Microsoft.

Circle #132 on Reader Service Card

Epilogue

Where have these five years left us?

John Walker

Looking at the answers to the fifth-anniversary questionnaires, I think we can use them to do two things: to see where we've been, and to ask what changes might be in store for the future.

Originally, it was easy to define a Heath user: we all had the same machines, and the same software. But behind that obvious fact, there was a subtler one: we had similar interests and similar outlooks.

Heath/Zenith started out as just Heath, and Heathkit people are tinkerers, hackers. They want to get "inside" things—whether hardware or software. They tend to admire innovation, and they want to achieve technical proficiency. Moreover, many of them see computing as something to be learned for its own sake.

The uniqueness of our machines and programs might have been the "badge" of the Heath/Zenith user, but what has really tied us together is a strong sense of community—a feeling that we're working with people who share our values.

The proportion of kitbuilders and hackers has declined as the microcomputer market has opened up to more and more people. And the newer machines are part of the IBM-compatible world; in some sense, we've lost our "badge."

Looking at the responses to our survey, I have to conclude that all of this has presented the Heath/Zenith community with a sort of identity crisis.

Community

First, it's well to remember that the total picture is larger than just Heath/Zenith. There are all the local HUGs, the national HUG, and *REMark*; there are the independent vendors; there are HUG newsletters and independent newsletters such as *H-Scoop* and *Buss*; there's *Sextant*; and there are individual writers, developers, and users who have made a mark on things.

So, where are we all going?

Regarding "the whole nine yards," our respondents seem to think we are basically healthy. Perhaps any pains may be best described as *growing* pains.

As far as Heath/Zenith computers and company policies are concerned, I think we can be hopeful. The machines provide room for as much innovation as developers want to try. And Heath/Zenith continues to have cordial relations with the independents.

(A note of caution, though: Zenith Data Systems has recently changed its dealer policies. They will no longer go through distributors; instead, ZDS will sell directly to dealers—but only to larger dealers. Smaller dealers should be able to buy through larger dealers, but I think little guys have been important to Heath/Zenith's success. Signs that Zenith may disagree are disconcerting.)

Technological innovation is coming back to the microcomputer market.

As far as the user community is concerned, I think we can be hopeful there, too. But *that* depends on *you*.

We've all got a challenge ahead. In shifting from mainly "hobby" to mainly "applications," the community has got to retain the values that Heathkit builders have brought to microcomputers.

The challenge is to learn as much as we can and to communicate a concern for responsibility and excellence. Five years ago, most of us knew developers and programmers—or did similar work on our own. "Responsibility" meant we came down hard on theft—whether software or hardware. A "concern for excellence" might have meant patching operating systems and talking to vendors about designing better products.

Today, we may not be as close to the professional developers and programmers. But we don't have to treat theft as inevitable. Newcomers and old-timers alike just have to be alert to the threat.

Today, a concern for excellence may no longer involve knowing how to patch operating systems. Nonetheless, I assume that "applications" people have standards which are just as high as any hacker could have had five years ago. We may just have to remind everyone that there's nothing wrong with having high standards—and acting on them.

If you're reading *Sextant*, of course, you've probably already decided that being a passive user isn't enough. But what about everyone else? A lot of people use Heath/Zenith computers simply because ZDS won a contract. Can we "reach" those people? (Frankly, I hope so: passive users don't buy computer magazines!)

Innovation

On a more positive note, there is little debate regarding the technical quality of Heath/Zenith computers: there, people still see Heath/Zenith as leading the pack. However, many of our respondents feel that Heath/Zenith technology was more innovative five years ago.

The problem, I think, is that an industry dedicated to IBM compatibility is bound to be a pretty ho-hum affair in many respects. Following a boring leader—even doing so *profitably*—does not sit well with people committed to innovation. That ill ease came out in the responses we received.

However, we've also got to think about the future. And there, a recap can only serve as a prelude. Right now, things are looking up.

As I indicated in the prologue to this special section, technological innovation is coming back to the microcomputer market: the lead is being taken away from IBM. Heath/Zenith's new Z386 moves into a field where IBM has held back. And the new Z181 laptop won *PC Magazine*'s Technical Excellence award at the Comdex show in November of 1986.

Altogether, not too bad an omen for starting to look at the *next* five years. △

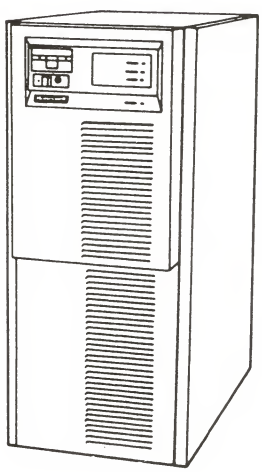
Now with Cambridge Script Processing

HONEYWELL USERS

Connect Your Z-100 Series Or Z-100 PC Series Computer To Honeywell Host Systems

The ultimate micro-to-mainframe link

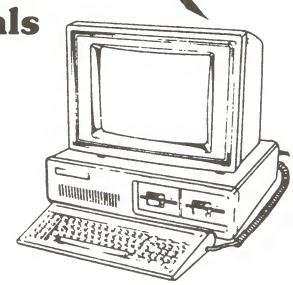
PC77/78 — Emulates the Honeywell VIP7700/VIP7800 series of synchronous terminals



Features:
• color attribute mapping • hot key to DOS • access host via multiple windows • print redirection • script processing • help facility • print spooling

File Transfer:
• menu driven • macro capability to bypass menus • data compression • file identification security features • attended and unattended mode of operation • restart capability • help facility

PC73/78 — Emulates the Honeywell VIP7200/VIP7300/ VIP7800 series of asynchronous terminals



Features:
• color attribute mapping • hot key to DOS • print redirection • script processing • help facility • print spooling

File Transfer:
• Kermit • Xmodem • ASCII • menu driven • macro capability to bypass menus • attended and unattended mode of operation

The personal computer can be connected to any Honeywell host via a modem, modem-bypass or multiple interface unit (MIU) and may reside on a communications line with other PC's or terminals. No host system or application software modification, regardless of the operating system is required.

High-performance communications software from:

Cambridge Computer Corporation
80 Mount Sanford Road, Mount Carmel, CT 06518-1210
203/288-6004, Telex 6502236599

Honeywell is a trademark of Honeywell, Inc.

Circle #197 on Reader Service Card

Index to *Sextant* #1-#26

This index covers the first 26 issues of Sextant, *from Spring 1982 through January-February 1987. The articles are categorized by subject, and many of the articles are listed more than once. The first column of each entry contains the issue number. The page number is given after the title of the article. Back issues are available for $3.50 from* Sextant. *(See page 63.)*

Assembly Language, see **Programming**

BASIC, see **Programming**

Batch Command Processing
10 Take Advantage of Z-DOS Batch Files, p. 79
14 Put HDOS Commands on Disk, p. 37
14 New Generation Brings the Charm of Unix to CP/M, p. 75
15 Another Approach to Command Processing Under HDOS, p. 85
24 Z100 Notebook, p. 37

Books/Book Reviews
3 Experiment with Artificial Intelligence on your Heath/Zenith Computer, p. 31
5 Zenith/Heath Computers: Words & Pictures, p. 65
14 Hugh Kenner's Book for the Z100 Beginner, p. 31
15 Seidel's Book on Microsoft COBOL, p. 71
21 C Notes, p. 63
22 C Notes, p. 57
24 Z100 Notebook, p. 37
25 C Notes, p. 65

Bulletin Boards
22 Z100 Notebook, p. 47
22 The Eight-Bit World, p. 23
25 The Eight-Bit World, p. 23

Business, see also **Desktop Utilities**
3 How to Save Kilobucks with a Business Microcomputer, p. 51
4 Eight Spreadsheets Compared: Charting Products to Eliminate Tedious Calculations, p. 40
7 dBASE II Comes to Heath/Zenith, p. 9
12 1-2-3 for the '110/120, p. 47
13 Three Products to Write Your Letters for You, p. 63

C, see **Programming**

COBOL, see **Programming**

Communications—Hardware
2 Zenith Introduces Smart Communications Terminal, p. 43
19 Upgrade an Internal Modem for Your '100, p. 77
26 The Eight-Bit World, p. 33
—Software
—CP/M
12 Communing by Computer, p. 41
13 Moving Your Old CP/M Files to Your New Computer, p. 39
23 The Eight-Bit World, p. 71
24 The Eight-Bit World, p. 25
25 The Eight-Bit World, p. 23
26 The Eight-Bit World, p. 33
26 Writing Hardware-Independent Terminal Emulators for CP/M and MS-DOS, p. 56
—HDOS
12 Communing by Computer, p. 41
—MS-DOS/Z-DOS
12 Communing by Computer, p. 41
12 Z-DOS Communications Roundup, p. 69
22 Z100 Notebook, p. 47
24 Z100 Notebook, p. 37
26 Writing Hardware-Independent Terminal Emulators for CP/M and MS-DOS, p. 56

Compatibility, see also **IBM Compatibility**
10 Windows Opens the Door to Compatibility, p. 9
13 Moving Your Old CP/M Files to Your New Computer, p. 39

Conferences and Fairs
2 Heath/Zenith Independent Support Highlights the 7th West Coast Computer Faire, p. 8
2 The First Ever: National Heath/Zenith Users' Conference, p. 80
4 HUGCON 1, p. 7
4 Coming Attraction: The Heath/Zenith Community Goes to the Faire, p. 92
5 CHUGCON 82, p. 7
5 New Products I'd Like to See: CHUGCON 82 Banquet Remarks, p. 16
6 CP/M '83, p. 11
6 At the Faire: The Heath/Zenith Community, p. 65
8 HUGCON 2—Twice as Good, p. 81
9 CHUGCON 83: Sharing Expertise, p. 41
11 Scuttlebutt at the Faire, p. 49
14 Scuttlebutt at HUGCON 3, p. 71
15 Heath/Zenith Dominates Air Force Small Computer Conference, p. 33
16 CHUGCON 84—Back for More, p. 19
16 HUGCON West Takes Off, p. 37
18 Navy Micro '85, p. 11
19 Back for More at HUGCON 4, p. 11
21 Free Nanoseconds Highlight CHUGCON 85, p. 9
22 WRHUGCON's Magic Kingdom, p. 9
24 The Spirit of St. Louis, p. 68
25 Computer Diversity in Chicago, p. 80
26 The Eight-Bit World, p. 33
26 CHUGCON 86: Old Friends and New, p. 70

CP/M, see **Operating Systems**; see also **Utilities**

Data Base Software
—CP/M
7 dBASE II Comes to Heath/Zenith, p. 9
16 Computerized Card Files—By Jupiter, p. 31
—HDOS
23 A Low-Budget Data Base for HDOS, p. 47
—MS-DOS/Z-DOS
12 1-2-3 for the '110/120, p. 47

Desktop Utilities
—CP/M
23 The Eight-Bit World, p. 71
—MS-DOS/Z-DOS
20 Software Roundup: Five Desktop Utilities for the Z100, p. 6
21 C Notes, p. 63
24 Z100 Notebook, p. 37

Disk Controllers
4 Venturing Beyond the Heath/Zenith Disk Controller, p. 67
4 A Survey of Disk Controller Alternatives, p. 74
23 Adapt Your Soft-Sector Controller to Use Hard-Sectored Disks, p. 25

Disk Drives
11 The Z67 Winchester: Use It With HDOS as Well as CP/M, p. 37
19 More Disk Capacity for Your '89, p. 57
23 Add More 5-1/4" Drives to Your Z100, p. 59
23 Adapt Your Soft-Sector Controller to Use Hard-Sectored Disks, p. 25

Disk Emulators
6 Taking a Look at Magnolia's Invisible Disk, p. 35
10 Put an Electronic Disk into Your H8, p. 33
13 Megabyte Memory for Your H8, p. 25
19 RAM Drives for the '100, p. 21
23 From FBE: 1216K RAM for Your '151, p. 39

Editors/Text Processors
—CP/M
1 A Professional Writer Looks at Budget Word Processing, p. 14
3 Budget Word Processing: A Followup, p. 59
4 IMAGE: a Word and Picture Processor, p. 35
7 Word Processing You Can Program, p. 33
11 Routinizing Repetitive Reports, p. 80
13 Three Products to Write Your Letters for You, p. 63
15 Customizing WordStar for a Dot-Matrix Printer, p. 49
17 The Benchmark Word Processor, p. 15
18 The Quest for the Ultimate Word Processor, p. 17
20 Palantir: Word Processing for Any Heath/Zenith Computer, p. 47
23 The Eight-Bit World, p. 71
—HDOS
1 A Professional Writer Looks at Budget Word Processing, p. 14
3 Budget Word Processing: A Followup, p. 59
10 Turn Your Computer into an Electronic Typewriter, p. 30
11 Routinizing Repetitive Reports, p. 80
16 Date Your HDOS Printouts Automatically, p. 69
23 The Eight-Bit World, p. 71
—MS-DOS/Z-DOS
7 Word Processing You Can Program, p. 33
13 Three Products to Write Your Letters for You, p. 63
14 Microsoft Word and Mouse: Do They Click?, p. 7
14 WatchWord: Custom Built for You and Your Z100, p. 23
15 Customizing WordStar for a Dot-Matrix Printer, p. 49
15 Galahad: Clarkson's Gift to the '100, p. 61
17 The Benchmark Word Processor, p. 15
18 The Quest for the Ultimate Word Processor, p. 17
20 Palantir: Word Processing for Any Heath/Zenith Computer, p. 47
22 C Notes, p. 57
22 Z100 Notebook, p. 47
22 Patching Away the WordStar Wait, p. 53
23 Microsoft Word, Version 2, p. 17
25 Patching Word's .PRN Files for More Printer Features, p. 59
26 C Notes, p. 49

Education
5 The Heath Educational Robot: Dramatically Instructive, p. 83
6 Passwords and Record-Keeping: One School's Solution, p. 37
8 Kids & Computers: Herbert Is My Best Friend, p. 8
8 The '89 Goes to College, p. 23
9 A Z100 on Every Desk: Clarkson College, p. 8
10 Educational Software Roundup, p. 43
14 Heathkit Hackers at Home, p. 41
15 Galahad: Clarkson's Gift to the '100, p. 61
19 Make Your '89 Speak Greek, p. 27
20 HERO on Patrol, p. 41
25 An MBASIC Simulation, p. 52

Emulation, see **IBM Compatibility**

Family Computing
7 Confessions of a Technoklutz, p. 97
8 Kids & Computers: Herbert Is My Best Friend, p. 8
9 How One Family Learned to Live with an H89: A Dialogue, p. 91

File and Disk Management
7 Index Your HDOS Disks, p. 88
9 Disk and File Management, p. 97
13 File Naming Conventions, p. 79

File Conversion/Media Transfer
13 Moving Your Old CP/M Files to Your New Computer, p. 39
26 Z100 Notebook, p. 17

FORTH, see **Programming**

FORTRAN, see **Programming**

Games/Entertainment Software
—CP/M
6 Program Some Improbable Prognostications, p. 81
7 BASIC Battleship, p. 25
8 Games Roundup, p. 45
12 A Canoe Ride in BASIC, p. 65
13 Wormrace, p. 61
14 MBASIC Marquee, p. 69
16 SYMON Says: Challenge Your Memory, p. 51
20 DISCOVER: An MBASIC Guessing Game, p. 27
25 Play Apples and Floors on Your '100, p. 41
—HDOS
1 Rubik's Cube: A Computer Simulation in Microsoft BASIC, p. 43
6 Program Some Improbable Prognostications, p. 81
8 Games Roundup, p. 45
14 MBASIC Marquee, p. 69
16 SYMON Says: Challenge Your Memory, p. 51
—MS-DOS/Z-DOS
8 Games Roundup, p. 45
16 SYMON Says: Challenge Your Memory, p. 51
20 Z-BASIC Battleship, p. 77
25 Play Apples and Floors on Your '100, p. 41

Graphics
1 How to Turn Zenith Screen Graphics into Color Slides, p. 25
—Hardware
3 Graphics on Your H8, p. 79
18 A Look at SigmaSoft's Interactive Graphics Controller, p. 49
25 Upgrade the ZVM-134 to Display 16 Colors, p. 27
22 G-Prom: Give Your '19 or '89 More Graphics, Better Characters, p. 27
—Software
—CP/M
3 Graphics on Your H8, p. 79
4 IMAGE: a Word and Picture Processor, p. 35
9 Drawing on Your Heath/Zenith Computer: Ed-A-Sketch, p. 17
9 Screen Dump!, p. 61
10 Color Graphics for Your '8 or '89, p. 15
10 Graphics Algorithm Optimized for 8080 or Z80, p. 63
16 Great Graphics on the '19 and '89, p. 25
18 A Look at SigmaSoft's Interactive Graphics Controller, p. 49
25 An MBASIC Simulation, p. 52
—HDOS
3 Graphics on Your H8, p. 79
9 Drawing on Your Heath/Zenith Computer: Ed-A-Sketch, p. 17
9 Screen Dump!, p. 61
10 Color Graphics for Your '8 or '89, p. 15
16 Great Graphics on the '19 and '89, p. 25
18 A Look at SigmaSoft's Interactive Graphics Controller, p. 49
—MS-DOS/Z-DOS
15 Teach Your Z100 Greek, p. 25
15 Quick and Easy Graphs on Your '100 and '150, p. 42
15 Z-BASIC Graphics: Using GET and PUT, p. 93
16 Great Graphics on the '19 and '89, p. 25
17 Affordable Graphics for the Z100, p. 7
17 Making Z-BASIC More Colorful, p. 106
18 Tektronix Terminal Emulation for Your Z100, p. 77
19 Z-BASIC's CIRCLE Does More Than Draw Circles, p. 102
22 C Notes, p. 57
24 Print Big in BASIC (or Turbo Pascal), p. 33
25 Z100 Notebook, p. 48
26 C Notes, p. 49
26 Winning Fractals, p. 6

Hardware Enhancements, see listings by computer model (e.g., **H8**); or by specific enhancement (e.g., **Speed Modifications/Improvements**)

HDOS, see **Operating Systems**; see also **Utilities**

Heath/Zenith, see **Zenith**

Heath Users' Groups (HUGs), see **Users' Groups**

Home/Personal
5 Cooking with "Computer Chef", p. 49
8 Kids & Computers: Herbert Is My Best Friend, p. 8
8 Tracking Home Finances with the Home Finance System, p. 31
14 Heathkit Hackers at Home, p. 41
24 The Eight-Bit World, p. 25

IBM Compatibility
9 Why Won't All That IBM-PC Software Run on My Z100?, p. 51
11 Zenith Improves on the IBM Personal Computer, p. 9
14 TMSI's H-1000: Grafting an 8086 Onto Your '89, p. 17
23 Z100 Notebook, p. 33
24 IBM Emulation with the Gemini Board, p. 64
25 IBM Emulation with the UCI EasyPC, p. 17

Interfaces
1 A Parallel Interface for the '89, p. 61
13 Piggyback a Parallel Port on Your '89, p. 67
14 Let Your '89 W.I.S.E. Up, p. 45

Keyboards
6 Automatic Key-Repeat for Your '19 or '89, p. 79
17 Add Automatic Key Repeat to Your '89 or '19, p. 54
24 C Notes, p. 47

Lisp, see **Programming**

Logo, see **Programming**

Mathematics/Statistics
4 Getting There Faster: Benchmarking Math Chip vs. Compiler, p. 62
10 Graphics Algorithm Optimized for 8080 or Z80, p. 63
21 Speeding Up Your '100 or '150 With the 8087 Math Chip, p. 33

Memory
6 Taking a Look at Magnolia's Invisible Disk, p. 35
8 Adding 16K Memory to the '89—A Low-Budget Alternative, p. 65
10 Put an Electronic Disk into Your H8, p. 33
13 Megabyte Memory for Your H8, p. 25
14 TMSI's H-1000: Grafting an 8086 Onto Your '89, p. 17
15 Salvage Memory Contents Under CP/M or MS-DOS, p. 21
19 RAM Drives for the '100, p. 21
23 From FBE: 1216K RAM for Your '151, p. 39
24 Probing the Subconscious Memory of the Z100, p. 17
26 Four Upgrades for the '89, p. 37

Modems, see **Communications—Hardware**

Monitors
25 Upgrade the ZVM-134 to Display 16 Colors, p. 27

Moving
2 What to Do with Your H88/89 After the Movers Have Finished Playing Soccer and Dropsy with It, p. 29
12 You Can Take It With You: Your Computer in a Low-Tech Environment, p. 11

MS-DOS, see **Operating Systems**; see also **Utilities**

Operating Systems, see also **Utilities**
—CP/M
5 An Introduction to CP/M for Assembly Language Programmers, p. 69
6 CP/M '83, p. 11
8 A New CP/M for the '89, p. 68
14 New Generation Brings the Charm of Unix to CP/M, p. 75
16 CP/M Plus Exploits More Memory, p. 9
17 ZCPR—A Public Domain Enhancement for CP/M's Command Processor, p. 29
18 Heath CP/M Reads Foreign Disks, p. 31
21 The Eight-Bit World, p. 49
21 Z100 Notebook, p. 85
22 Two Ways Your '100 Can Run CP/M Software Under MS-DOS/Z-DOS, p. 43
22 The Eight-Bit World, p. 23
23 The Eight-Bit World, p. 71
24 The Eight-Bit World, p. 25
25 The Eight-Bit World, p. 23
26 Z100 Notebook, p. 17
26 The Eight-Bit World, p. 33
26 Four Upgrades for the '89, p. 37
26 Writing Hardware-Independent Terminal Emulators for CP/M and MS-DOS, p. 56
—HDOS
2 Crucial Secrets of HDOS Let You Write Device-Independent Programs, p. 45
4 Interrupt Programming Under HDOS, p. 78
5 Understanding HDOS, pp. 12, 24, 40
6 Squeeze More Disk Space Out of HDOS, p. 33

H8
3 The H8's Fifth Anniversary: Origins and Outlooks, p. 11
3 Graphics on Your H8, p. 79
4 A Survey of Disk Controller Alternatives, p. 74
5 Improve Your H8's Reliability: Install the Trionyx Motherboard, p. 57
5 Improve Your H8's Reliability: Add a Fan, p. 63
7 Make Your '8 Think Like an '89—Only Faster, p. 29
10 Color Graphics for Your '8 or '89, p. 15
10 Put an Electronic Disk into Your H8, p. 33
11 The Z67 Winchester: Use It with HDOS as Well as CP/M, p. 37
13 Megabyte Memory for Your H8, p. 25
16 Great Graphics on the '19 and '89, p. 25
18 A Look at SigmaSoft's Interactive Graphics Controller, p. 49
21 The Eight-Bit World, p. 49
22 The Eight-Bit World, p. 23
22 FORTRAN Routines for Interactive Programs on Your '19/'89, p. 75
23 The Eight-Bit World, p. 71
23 Adapt Your Soft-Sector Controller to Use Hard-Sectored Disks, p. 25
24 The Eight-Bit World, p. 25
25 The Eight-Bit World, p. 23
26 The Eight-Bit World, p. 33
26 Writing Hardware-Independent Terminal Emulators for CP/M and MS-DOS, p. 56

H11
3 Public Domain Software for Your H11, p. 63
4 Getting There Faster: Benchmarking Math Chip vs. Compiler, p. 62

H19
6 Automatic Key-Repeat for your '19 or '89, p. 79
16 Great Graphics on the '19 and '89, p. 25
17 Add Automatic Key Repeat to Your '89 or '19, p. 54
18 A Look at SigmaSoft's Interactive Graphics Controller, p. 49
22 FORTRAN Routines for Interactive Programs on Your '19/'89, p. 75
22 G-Prom: Give Your '19 or '89 More Graphics, Better Characters, p. 27

H/Z89-90
1 A Parallel Interface for the '89, p. 61
3 Give Your '89 a Boot—Automatically, p. 55
4 Venturing Beyond the Heath/Zenith Disk Controller, p. 67
4 A Survey of Disk Controller Alternatives, p. 74
6 Taking a Look at Magnolia's Invisible Disk, p. 35
6 Waldo and Artra, Inc., p. 45
6 Automatic Key-Repeat for Your '19 or '89, p. 79
8 Adding 16K Memory to the '89—A Low-Budget Alternative, p. 65
9 Build a Sound/Clock Board for Your '89, p. 78
10 Color Graphics for Your '8 or '89, p. 15
11 The Z67 Winchester: Use It with HDOS as Well as CP/M, p. 37
12 Dual Speed on Your '89, p. 17
13 The H89's Fifth Birthday: Origins and Outlooks, p. 9
13 Piggyback a Parallel Port on Your '89, p. 67
14 TMSI's H-1000: Grafting an 8086 Onto Your '89, p. 17
14 Let Your '89 W.I.S.E. Up, p. 45
16 Great Graphics on the '19 and '89, p. 25
16 Add an Automatic Brightness Control to Your '89, p. 45
17 Add Automatic Key Repeat to Your '89 or '19, p. 54
18 A Look at SigmaSoft's Interactive Graphics Controller, p. 49
19 More Disk Capacity for Your '89, p. 57
21 The Eight-Bit World, p. 49
22 G-Prom: Give Your '19 or '89 More Graphics, Better Characters, p. 27
22 FORTRAN Routines for Interactive Programs on Your '19/'89, p. 75
22 The Eight-Bit World, p. 23
23 The Eight-Bit World, p. 71
23 Adapt Your Soft-Sector Controller to Use Hard-Sectored Disks, p. 25
24 The Eight-Bit World, p. 25
25 The Eight-Bit World, p. 23
26 The Eight-Bit World, p. 33
26 Four Upgrades for the '89, p. 37

9 More on HDOS STAND-ALONE, p. 71
14 Put HDOS Commands on Disk, p. 37
15 Another Approach to Command Processing Under HDOS, p. 85
21 The Eight-Bit World, p. 49
22 The Eight-Bit World, p. 23
23 The Eight-Bit World, p. 71
24 The Eight-Bit World, p. 25
24 A Fail-Safe Disk-Mount PROLOGUE for HDOS, p. 42
25 The Eight-Bit World, p. 23
25 Rigging Up a CTRL-P for HDOS, p. 33
26 The Eight-Bit World, p. 33
26 Four Upgrades for the '89, p. 37

—MS-DOS/Z-DOS
8 Getting Into Z-DOS Assembly Language—Quietly, p. 89
10 Windows Opens the Door to Compatibility, p. 9
10 Take Advantage of Z-DOS Batch Files, p. 79
15 Teach Your Z100 Greek, p. 25
17 Moving Up to MS-DOS 2, p. 64
21 How to Use PROMPT on the '100 and '150, p. 53
21 C Notes, p. 63
21 Z100 Notebook, p. 85
22 Two Ways Your '100 Can Run CP/M Software Under Z-DOS/MS-DOS, p. 43
22 Z100 Notebook, p. 47
23 Z100 Notebook, p. 33
23 Add More 5-1/4" Drives to Your Z100, p. 59
24 Z100 Notebook, p. 37
26 Z100 Notebook, p. 17
26 The Programmer's Utility Pack: Useful Tools for the '100 and '150, p. 25
26 Writing Hardware-Independent Terminal Emulators for CP/M and MS-DOS, p. 56

Pascal, see **Programming**

Print Spoolers
1 Print Spoolers: A Background and Reviews of Six Software Products to Break Your Printer Bottleneck, p. 32
6 Inside a Spooler, p. 85

Printer Interfacing
15 Customizing WordStar for a Dot-Matrix Printer, p. 49
25 Rigging Up a CTRL-P for HDOS, p. 33
25 Patching Word's .PRN Files For More Printer Features, p. 59
26 Four Upgrades for the '89, p. 37

Printer Utilities
24 Print Big in BASIC (or Turbo Pascal), p. 33
25 Rigging Up a CTRL-P for HDOS, p. 33
25 A C Utility that Does More than PRINT, p. 43
25 Patching Word's .PRN Files For More Printer Features, p. 59

Printers—Modifications/Supplies
6 Letting Lindley Systems Drive Your Epson Printer, p. 55
8 Letter-Quality Printing on a Dot-Matrix Budget, p. 15
8 More Than Just a Pretty Typeface, p. 39
9 Create Forms on Your MX-80, p. 33
10 Doctor Your Daisywheel Device Driver, p. 37
11 Four Letter-Quality Printers Under $1,000, p. 21
14 Getting the Most Out of an Okidata Printer Under Z-DOS, p. 63
15 Customizing WordStar for a Dot-Matrix Printer, p. 49
20 Letter Quality, Dot Matrix: the MT-160L Printer, p. 99
22 C Notes, p. 57

Programming
—Assembly Language
1 Disk Programming Without HDOS, p. 48
2 Crucial Secrets of HDOS Let You Write Device-Independent Programs, p. 45
4 Interrupt Programming Under HDOS, p. 78
5 An Introduction to CP/M for Assembly Language Programmers, p. 69
8 Getting Into Z-DOS Assembly Language—Quietly, p. 89
9 Screen Dump!, p. 61
26 Writing Hardware-Independent Terminal Emulators for CP/M and MS-DOS, p. 56

H/Z100-110-120
2 Introducing: the Brain of the Z-Machine, p. 99
2 The Z100 Series: New Zenith Computer Line Offers Something for Everyone, p. 106
3 The Z100's User's Manual: Clear, Concise, and Useful, p. 71
7 Building Heathkit's H120, p. 45
7 A Human Factors Evaluation of the Z110, p. 55
13 Moving Your Old CP/M Files to Your New Computer, p. 39
14 Hugh Kenner's Book for the Z100 Beginner, p. 31
15 Z100 Notebook, p. 15
15 Teach Your Z100 Greek, p. 25
16 Speed Up Your '100 50%, p. 15
16 Z100 Notebook, p. 61
16 A Critical Look at the 8088, p. 75
17 Build Your Z100 a Real-Time Clock, p. 20
17 Z100 Notebook, p. 39
18 Z100 Notebook, p. 57
19 RAM Drives for the '100, p. 21
19 Z100 Notebook, p. 39
19 Del Scientific Speeds Up Your '100, p. 63
19 Upgrade an Internal Modem for Your '100, p. 77
20 Z100 Notebook, p. 57
21 Z100 Notebook, p. 85
21 Speeding Up Your '100 or '150 With the 8087 Math Chip, p. 33
21 How to Use PROMPT on the '100 and '150, p. 53
22 Two Ways Your '100 Can Run CP/M Software Under Z-DOS/MS-DOS, p. 43
22 ROM Monitor Routines of the '100 and '150, p. 33
22 Keep Your '100 Timely and Up to Date with ZCLK, p. 17
22 Z100 Notebook, p. 47
23 Z100 Notebook, p. 33
23 Add More 5-1/4" Drives to Your Z100, p. 59
23 BASIC Fractals, p. 76
24 Probing the Subconscious Memory of the Z100, p. 17
24 IBM Emulation with the Gemini Board, p. 64
24 Z100 Notebook, p. 37
25 IBM Emulation With the UCI EasyPC, p. 17
25 Z100 Notebook, p. 48
26 Winning Fractals, p. 6
26 The Programmer's Utility Pack: Useful Tools for the '100 and '150, p. 25
26 Z100 Notebook, p. 17
26 Writing Hardware-Independent Terminal Emulators for CP/M and MS-DOS, p. 56

H/Z138-148-150-158-160
11 Zenith Improves on the IBM Personal Computer, p. 9
14 Microsoft Word and Mouse: Do They Click?, p. 7
16 A Critical Look at the 8088, p. 75
18 Weighing the Merits of the Z160, p. 41
21 Speeding Up Your '100 or '150 With the 8087 Math Chip, p. 33
21 How to Use PROMPT on the '100 and '150, p. 53
22 ROM Monitor Routines of the '100 and '150, p. 33
22 C Notes, p. 57
23 Add More 5-1/4" Drives to Your Z100, p. 59
23 BASIC Fractals, p. 76
23 From FBE: 1216K RAM for Your '151, p. 39
24 New Life for the Z150 from Gate Arrays, p. 9
25 Upgrade the ZVM-134 to Display 16 Colors, p. 27
26 Zenith: Planning for the Future, p. 13
26 Winning Fractals, p. 6
26 The Programmer's Utility Pack: Useful Tools for the '100 and '150, p. 25
26 Writing Hardware-Independent Terminal Emulators for CP/M and MS-DOS, p. 56

H/Z200-241-248
21 A Quick Look at the Z200, p. 29
25 Upgrade the ZVM-134 to Display 16 Colors, p. 27
26 Zenith: Planning for the Future, p. 13

HERO
5 The Heath Educational Robot: Dramatically Instructive, p. 83
20 HERO on Patrol, p. 41

14 Put HDOS Commands on Disk, p. 37
15 Another Approach to Command Processing Under HDOS, p. 85
16 Date Your HDOS Printouts Automatically, p. 69
17 DEBUGging the Z100 Key Click, p. 63
17 OFFLIN: An Exercise in Z100 Assembly Language, p. 89
18 Heath CP/M Reads Foreign Disks, p. 31
22 FORTRAN Routines for Interactive Programs on Your '19/'89, p. 75
23 Adapt Your Soft-Sector Controller to Use Hard-Sectored Disks, p. 25
24 A Fail-Safe Disk-Mount PROLOGUE for HDOS, p. 42
25 C Notes, p. 65
26 Writing Hardware-Independent Terminal Emulators for CP/M and MS-DOS, p. 56
26 The Programmer's Utility Pack: Useful Tools for the '100 and '150, p. 25

—BASIC
1 Benton Harbor BASIC Tests Typing Reaction Time, p. 30
1 Rubik's Cube: A Computer Simulation in Microsoft BASIC, p. 43
2 Renumbering Benton Harbor BASIC, p. 58
2 Put Some Structure in Your BASIC Programming, p. 83
3 Double-Precision Trig Functions, p. 62
5 Format Your BASIC Programs for Readability and Ease of Modification, p. 51
6 Program Some Improbable Prognostications, p. 81
7 BASIC Battleship, p. 25
8 More Double-Precision Trig Functions, p. 98
9 Optimizing Benton Harbor BASIC's Numerical Output, p. 25
9 Create Forms on Your MX-80, p. 33
10 Turn Your Computer into an Electronic Typewriter, p. 30
10 Classy Bar Graphs, p. 55
11 Exploring MBASIC Roundoff Error, p. 33
12 BASIC Grocery Shopping, p. 23
12 A Canoe Ride in BASIC, p. 65
13 Making Z-BASIC Friendlier, p. 17
13 Screen Out Improper Input, p. 35
13 Trap Errors Without Losing Error Messages, p. 45
13 Wormrace, p. 61
14 Getting the Most Out of an Okidata Printer Under Z-DOS, p. 63
14 MBASIC Marquee, p. 69
14 Two Debugging Tricks for MBASIC, p. 97
15 Z-BASIC Graphics: Using GET and PUT, p. 93
16 SYMON Says: Challenge Your Memory, p. 51
16 Passing Variables with CHAIN and COMMON, p. 101
17 Making Z-BASIC More Colorful, p. 106
18 Menu Control with HDOS MBASIC, p. 65
18 Tektronix Terminal Emulation for Your Z100, p. 77
18 BASIC Questions and Answers, p. 91
19 Make Your '89 Speak Greek, p. 27
19 BASIC Questions and Answers, p. 95
19 Z-BASIC's CIRCLE Does More Than Draw Circles, p. 102
20 DISCOVER: An MBASIC Guessing Game, p. 27
20 Z-BASIC Battleship, p. 77
21 BASIC Questions and Answers, p. 17
21 Speeding Up Your '100 or '150 With the 8087 Math Chip, p. 33
21 See Seven Sorts, p. 73
22 Z-BASIC Z-BASIC Preprocessor: Programs Without Line Numbers, p. 69
23 BASIC Fractals, p. 76
25 Z100 Notebook, p. 48
25 An MBASIC Simulation, p. 52
26 Winning Fractals, p. 6

—C
21 Speeding Up Your '100 or '150 With the 8087 Math Chip, p. 33
21 C Notes, p. 63
21 Z100 Notebook, p. 85
22 C Notes, p. 57
23 Z100 Notebook, p. 33
23 C Notes, p. 52
24 C Notes, p. 47
25 A C Utility that Does More than PRINT, p. 43
25 Z100 Notebook, p. 48
25 C Notes, p. 65
26 Z100 Notebook, p. 17
26 C Notes, p. 49
26 Writing Hardware-Independent Terminal Emulators for CP/M and MS-DOS, p. 56

—COBOL
15 Seidel's Book on Microsoft COBOL, p. 71

—FORTH
12 Forth Goes Heath/Zenith, p. 27
21 Speeding Up Your '100 or '150 With the 8087 Math Chip, p. 33

—FORTRAN
6 Avoid Unnecessary FORTRAN Input, p. 61
21 Speeding Up Your '100 or '150 With the 8087 Math Chip, p. 33
22 FORTRAN Routines for Interactive Programs on Your '19/'89, p. 75

—Lisp
20 Customizing muLisp for the '89 and '100, p. 81

—Logo
25 Z100 Notebook, p. 48

—Pascal
1 A Candid Look at Tiny Pascal, p. 53
6 Pascal Elucidated, p. 27
11 Introduction to Pascal: Part 1, p. 73
12 Introduction to Pascal: Part 2, p. 57
13 Introduction to Pascal: Part 3, p. 49
14 File Management Under Lucidata Pascal, p. 49
21 Speeding Up Your '100 or '150 With the 8087 Math Chip, p. 33
24 Print Big in BASIC (or Turbo Pascal), p. 33
24 Sorting on Your Terms Rather than the Computer's, p. 51
25 Turbo Pascal: The New Basic Language?, p. 9

Reader Surveys

8 Heath/Zenith Users in Uniform, p. 75
14 Heathkit Hackers at Home, p. 41
15 A *Sextant* Survey: Research and Development Using Heath/Zenith Computers, p. 9
15 Software When You Have More Time Than Money, p. 77

Software, by Operating System

—CP/M

1 Print Spoolers: A Background and Reviews of Six Software Products to Break Your Printer Bottleneck, p. 32
4 IMAGE: a Word and Picture Processor, p. 35
4 Eight Spreadsheets Compared: Charting Products to Eliminate Tedious Calculations, p. 40
5 Cooking with "Computer Chef", p. 49
7 dBASE II Comes to Heath/Zenith, p. 9
7 Word Processing You Can Program, p. 33
7 Z100 Software Roundup, p. 64
8 Games Roundup, p. 45
8 A New CP/M for the '89, p. 68
9 Drawing on Your Heath/Zenith Computer: Ed-A-Sketch, p. 17
9 Screen Dump!, p. 61
10 Educational Software Roundup, p. 43
13 Moving Your Old CP/M Files to Your New Computer, p. 39
13 Three Products to Write Your Letters for You, p. 63
14 New Generation Brings the Charm of Unix to CP/M, p. 75
15 Salvage Memory Contents Under CP/M or MS-DOS, p. 21
15 ROOTS Gets the Family Into Your Computer, p. 37
16 Computerized Card Files—By Jupiter, p. 31
16 SYMON Says: Challenge Your Memory, p. 51
17 The Benchmark Word Processor, p. 15
17 ZCPR—A Public Domain Enhancement for CP/M's Command Processor, p. 29
17 A Versatile Printer Driver for CP/M, p. 85
20 DISCOVER: An MBASIC Guessing Game, p. 27
20 Palantir: Word Processing for Any Heath/Zenith Computer, p. 47
20 Customizing muLisp for the '89 and '100, p. 81
21 Eight-Bit World, p. 49
21 See Seven Sorts, p. 73
22 Eight-Bit World, p. 23
22 Two Ways Your '100 Can Run CP/M Software Under Z-DOS/MS-DOS, p. 43
22 FORTRAN Routines for Interactive Programs on Your '19/'89, p. 75
23 Eight-Bit World, p. 71
24 Eight-Bit World, p. 25
24 Sorting on Your Terms Rather Than the Computer's, p. 51
25 Turbo Pascal: The New Basic Language?, p. 9
25 Play Apples and Floors on Your '100, p. 41
25 An MBASIC Simulation, p. 53
25 C Notes, p. 65
26 Z100 Notebook, p. 17
26 Eight-Bit World, p. 35
26 Four Upgrades for the '89, p. 37
26 Writing Hardware-Independent Terminal Emulators for CP/M and MS-DOS, p. 56

—HDOS
1 A Professional Writer Looks at Budget Word Processing, p. 14
1 Print Spoolers: A Background and Reviews of Six Software Products to Break Your Printer Bottleneck, p. 32
3 Budget Word Processing: A Followup, p. 59
4 Eight Spreadsheets Compared: Charting Products to Eliminate Tedious Calculations, p. 40
4 T & E associates: "Just Home Folks" Implementing HDOS Utilities, p. 57
8 Tracking Home Finances with the Home Finance System, p. 31
8 Games Roundup, p. 45
9 Drawing on Your Heath/Zenith Computer: Ed-A-Sketch, p. 17
9 Create Forms on Your MX-80, p. 33
9 Screen Dump!, p. 61
10 Educational Software Roundup, p. 43
12 BASIC Grocery Shopping, p. 23
15 ROOTS Gets the Family Into Your Computer, p. 37
16 SYMON Says: Challenge Your Memory, p. 51
16 Date Your HDOS Printouts Automatically, p. 69
18 Menu Control with HDOS MBASIC, p. 65
19 Make Your '89 Speak Greek, p. 27
19 HDOS Enhancements from T & E, p. 33
19 A Software Clock for HDOS, p. 67
21 Eight-Bit World, p. 49
23 A Low-Budget Data Base for HDOS, p. 47
24 Eight-Bit World, p. 25
24 A Fail-Safe Disk-Mount PROLOGUE for HDOS, p. 42
24 Sorting on Your Terms Rather Than the Computer's, p. 51
25 Rigging Up a CTRL-P for HDOS, p. 33
26 Eight-Bit World, p. 35
26 Four Upgrades for the '89, p. 37
—MS-DOS/Z-DOS
7 Word Processing You Can Program, p. 33
7 Z100 Software Roundup, p. 64
8 Games Roundup, p. 45
10 Windows Opens the Door to Compatibility, p. 9
10 Educational Software Roundup, p. 43
11 Pi à la Mode on the Z100, p. 17
12 1-2-3 for the '110/120, p. 47
12 Z-DOS Communications Roundup, p. 69
13 Three Products to Write Your Letters for You, p. 63
14 Microsoft Word and Mouse: Do They Click?, p. 7
14 WatchWord: Custom Built for You and Your Z100, p. 23
15 Salvage Memory Contents Under CP/M or MS-DOS, p. 21
15 Teach Your Z100 Greek, p. 25
15 ROOTS Gets the Family Into Your Computer, p. 37
15 Quick and Easy Graphs on Your '100 and '150, p. 42
15 Galahad: Clarkson's Gift to the '100, p. 61
16 SYMON Says: Challenge Your Memory, p. 51
17 Affordable Graphics for the Z100, p. 7
17 The Benchmark Word Processor, p. 15
17 OFFLIN: An Exercise in Z100 Assembly Language, p. 89
18 The Quest for the Ultimate Word Processor, p. 17
18 Tektronix Terminal Emulation for Your Z100, p. 77
20 Software Roundup: Five Desktop Utilities for the H/Z100, p. 6
20 Palantir: Word Processing for Any Heath/Zenith Computer, p. 47
20 Z-BASIC Battleship, p. 77
20 Customizing muLisp for the '89 and '100, p. 81
21 BASIC Questions and Answers, p. 17
21 C Notes, p. 63
21 Z100 Notebook, p. 85
22 Two Ways Your '100 Can Run CP/M Software Under Z-DOS/MS-DOS, p. 43
22 Z100 Notebook, p. 47
22 Patching Away the WordStar Wait, p. 53
22 C Notes, p. 57
22 Z-BASIC Z-BASIC Preprocessor: Programs Without Line Numbers, p. 69
23 Microsoft Word, Version 2, p. 17
23 Z100 Notebook, p. 33
23 C Notes, p. 52
23 BASIC Fractals, p. 76
24 Eight-Bit World, p. 25
24 Print Big in BASIC (or Turbo Pascal), p. 33
24 Z100 Notebook, p. 37
24 C Notes, p. 47
25 Turbo Pascal: The New Basic Language?, p. 9
25 Play Apples and Floors on Your '100, p. 41
25 A C Utility that Does More than PRINT, p. 43
25 Z100 Notebook, p. 48
25 C Notes, p. 65

GRAPHICS PRINTER SUPPORT

Printer support is important at Paul F. Herman Inc. Because we know if you can't print it, chances are it isn't any good to you. That's why our DOODLER-V Graphics Package presently supports these printers as standard equipment . . .

Antex Data Systems	**Epson (Continued)**	**Olivetti**
ADS-2000	FX-100	DM-280
BMC Inc.	FX-85	DM-290
BX-80	FX-185	**Panasonic**
Bell & Howell	JX-80 color	KX-P1091
P-99	JX-100 color	KX-P1092
P-150	LQ-1500	**Radio Shack**
Blue Chip Elect.	LX-80	DMP-130 IBM mode
120/10	LX-100	DMP-430 IBM mode
Brother	MX-80 w/Grftrx	DMP-2100P IBM md
M-1509	MX-80 type III	DMP-2200 IBM md
Twinriter-5	MX-100 w/Grftrx	**Sakata**
Cal-Abco	MX-100 type III	SP-1000
Legend-800	P-80X	SP-1500
Centronics	RX-80	**Seikosha**
351-PC	RX-100	SP-1000A
GLP	**Genicom**	SP-1000AS
H-80	3014-I Eps mode	SP-1000I
H-136	3024-II Eps mode	**Star Micronics**
Citizen	**IDS**	DELTA-10
MSP-10	IDS-480	DELTA-15
MSP-15	P-80 color	GEMINI-10
MSP-20	P-132 color	GEMINI-10X
MSP-25	**IBM**	GEMINI-15
C. Itoh	ProPrinter	GEMINI-15X
24LQ color	**Mannesman Tally**	RADIX-10
1550	MT-85 Epson mode	RADIX-15
7500	Spirit-80	SD-10
8510	**Matra Comm.**	SD-15
Prowriter Jr.	Scanset Mini+	SG-10
Riteman	**MPI**	SG-15
Copal	Printmate 99	SR-10
SC-1200	Printmate 150G	SR-15
SC-1500	MPI-SX	**Texas Instruments**
SC-5500	**Okidata**	TI-850
DataProducts	ML-82A w/Okig.	TI-855
PT-8050 color	ML-83A w/Okig.	TI-865
PT-8070 color	ML-84 w/Okig.	**Toshiba**
DataSouth	ML-84 Step-2	1340
Pers. Printer I	ML-92	P-321
Pers. Printer II	ML-93	P-341
Epson	ML-182	
EX-800 color	ML-183	
EX-1000 color	ML-192	
FX-80	ML-193	

...and the list is growing day-by-day. DOODLER-V comes with guaranteed support for any graphics-capable printer. If your printer isn't on our list, we'll write a new print driver for it . . . or your money back!

DOODLER—V $99

PAUL F. HERMAN Inc.

Software Graphics Tools
3620 Amazon Drive, New Port Richey, FL 33553
813-376-5457

Circle #172 on Reader Service Card

Index to Advertisers

Reader Service #		Page#
	Analytical Products	
*	Word processing software.	24
*	H/Z89 enhancements.	39
	Aspen Systems	
149	Subroutine package & editor.	92
	A.U. Software	
130	Examination software.	34
	Bea-Soft	
150	'150 expansion case.	45
	Dante Bencivengo	
193	Z150-160 enhancements.	37
	Bersearch Information Services	
223	HERO programming support.	14
	Buss	
107	Free directory.	12
	BV Engineering	
155	Engineering software.	34
	Cambridge Computer Corp.	
197	Honeywell terminal emulation for '100, '150.	71
	Cardinal Point Inc.	
199	Printer commands handbook.	53
	C.D.R. Systems	
108	Hardware for H/Z89, H/Z100.	55
	CompuMagic	
156	CP/M utilities.	65
	The Computer Grove	
200	Software for Z100 systems.	59
	Conversational Computer Systems	
213	Turbo Pascal utilities.	36
	Cygnus	
137	Solar system simulation software.	62
	Al Davis	
122	Hardware.	53
	Ecosoft Inc.	
215	C compiler, software, books.	49
	ETTS	
148	Graphics software for H/Z100.	25
	FBE Research Company	
142	H/Z100 enhancements.	6
102	H/Z150 enhancements.	36
116	H/Z89 enhancements.	40
	Fina Software	
164	H/Z-25 enhancements.	53
	First Capitol Computer	
206	Zenith computers.	23
	Graymatter Application Software	
131	Enhancements for '100, '150.	85
	Hawkeye Grafix Inc.	
217	Software for MS-DOS, CP/M.	24
	Helix Software Co. Inc.	
210	Desktop utility for H/Z100.	3
	Paul F. Herman	
172	Graphics software for H/Z100, H/Z150.	77
	Hersey Micro Consulting	
168	H/Z150-200 console utility.	10
	Hilgraeve	
203	Communications software for '100, '150.	Back Cover
	Hogware	
144	Z100 graphics program.	86
	Hoyle & Hoyle Software	
113	Data base for HDOS, CP/M, MS-DOS.	62
	H-SCOOP	
221	Newsletter.	47
	Huff Software	
176	Technical word processing.	34
	Hughes Development Systems	
109	Z100 video enhancement.	35
	Intercontinental Micro Systems	
106	Network for '100, '150.	11
	Jay Gold Software	
120	Home finance system.	41
	KEA Systems	
175	Communications software; Z100 memory expansion.	7
	Liberty International	
*	IBM-PC emulator board for H/Z100.	27
	Lightek	
177	ICs & hardware.	37
	Lindley Systems	
118	H/Z100 hard drives.	29
118	Supplies, disks, utilities.	91
	Magnolia Microsystems	
134	'89 enhancements.	64
	Matcomm	
192	Supplies, disks.	65
	Micronics Technology	
208	Payroll, printer, and financial software.	17
207	Winchester for H/Z89, H/Z150-160 enhancements.	41
	Micro Systems Company	
101	Communications software.	88
	New Orleans General Data Services	
*	Graphics package for H/Z100, H/Z150.	88
	NORCOM	
163	H19 and H/Z89 character generator.	64
	Payload Computer Systems	
147	Hardware, software, supplies.	18-19
	P.C. Enterprises	
219	Software for '89, '100, '150.	17
	P.M.I.	
248	Z150 hardware enhancement.	9
	Premier Technologies	
190	Winchester for H/Z171.	28
	Quikdata	
221	Hardware, supplies.	46
	RAM Technology	
128	Memory for H/Z150.	79
129	Hardware, diskettes.	93
	Reichert Digital Systems	
151	Accounting software for Z150.	59
	Ross Custom Electronics	
160	EPROM programmer.	85
	Scottie Systems	
111	IBM emulation for '100.	14
	Secured Computer Systems	
157	H/Z89-90 enhancements.	40
	Sextant	
*	Subscriptions.	15
*	Back issues.	63
	Sextant Publishing Company	
*	Books.	30-31
*	Binder interface kits.	85
	SigmaSoft & Systems	
185	CAD and Winchester disk for H8 or H/Z89.	5
	Sirius Software	
212	Hardware, games.	51
	S & K Technology	
230	Word processor, spelling checkers.	91
	Skycastle Computer Products	
218	Printer enhancement software.	25
	SoftNet Communication Inc.	
132	Network for '100, '150, '200.	69
	Software Applications of Wichita	
189	Tax preparation templates for 1-2-3.	92
	Software Wizardry	
204	Speed enhancement for H/Z151-161.	67
	Spectre Technologies, Inc.	
198	CP/M & MS-DOS software.	33
	Technical Micro Systems	
173	Desktop utility for H8 and H/Z89.	58, 87, 90
	UCI Corporation	
180	IBM-PC emulator board, network for '100.	21
196	Hardware for '100 and '148.	43
	Workman & Associates	
229	CP/M, MS-DOS software.	29
	Zeducorp	
236	LAN connections.	7

* Contact advertiser directly.

Please refer to the key at the right when completing the article evaluation form on the attached Reader Service Card above. By letting us know how interesting and/or helpful you found each feature in this issue of *Sextant*, you will help us choose the best articles for you in the future.

1. Charles Floto, **Wildfire Speeds Up the '150 or '160 to Match the '158**, p. 8.
2. Kieran P. O'Leary, **WRHUGCON 3: HUGgies in Disneyland**, p. 13.
3. William N. Locke, **Z100 Notebook**, p. 20.
4. William M. Adney, **The PUP Utilities: Zenith's Useful Tools for the '100, '150, and '200**, p. 32.
5. Walter J. Janowski, **The Eight-Bit World**, p. 38.
6. Wayne Rash, Jr., **IBM Emulation With HUG's ZPC**, p. 42.
7. Joseph Katz, **C Notes**, p. 48.
8. Charles Horn and Bob Horn, **Build a Clock/Calendar for Your '89**, p. 80.
9. **Special Fifth Anniversary Section**, p. 54.

Name _____

Address _____

_____

City _____

State _____ ZIP _____

For further information from specific advertisers, refer to index on page 78 and circle number(s) below.

100	101	102	103	104	105	106	107	108	109
110	111	112	113	114	115	116	117	118	119
120	121	122	123	124	125	126	127	128	129
130	131	132	133	134	135	136	137	138	139
140	141	142	143	144	145	146	147	148	149
150	151	152	153	154	155	156	157	158	159
160	161	162	163	164	165	166	167	168	169
170	171	172	173	174	175	176	177	178	179
180	181	182	183	184	185	186	187	188	189
190	191	192	193	194	195	196	197	198	199
200	201	202	203	204	205	206	207	208	209
210	211	212	213	214	215	216	217	218	219
220	221	222	223	224	225	226	227	228	229
230	231	232	233	234	235	236	237	238	239
240	241	242	243	244	245	246	247	248	249

Reader Service Card
March-April 1987
Expires June 15, 1987

Please check *only* one box for each of the following questions.

Which microcomputer system do you own/use?

A. ☐ H88
B. ☐ H/Z89-90
C. ☐ H8
D. ☐ H11
E. ☐ H/Z100-110-120
F. ☐ H/Z150-158-160
G. ☐ Z138
H. ☐ Z148
I. ☐ Z171
J. ☐ Z200
K. ☐ Z241
L. ☐ Z248

How did you obtain this copy of *Sextant*?

1. ☐ Subscription
2. ☐ Retail Store
3. ☐ Friend
4. ☐ Single Copy Mail Order
5. ☐ Other

Please rate the articles in this issue for interest and helpfulness, using the key on page 78.

1	2	3	4	5	6	7	8	9	
☐	☐	☐	☐	☐	☐	☐	☐	☐	Excellent
☐	☐	☐	☐	☐	☐	☐	☐	☐	Good
☐	☐	☐	☐	☐	☐	☐	☐	☐	Fair
☐	☐	☐	☐	☐	☐	☐	☐	☐	Poor
☐	☐	☐	☐	☐	☐	☐	☐	☐	Didn't read

Comments _____

_____

_____

78a1

Name _____

Address _____

_____

City _____

State _____ ZIP _____

For further information from specific advertisers, refer to index on page 78 and circle number(s) below.

100	101	102	103	104	105	106	107	108	109
110	111	112	113	114	115	116	117	118	119
120	121	122	123	124	125	126	127	128	129
130	131	132	133	134	135	136	137	138	139
140	141	142	143	144	145	146	147	148	149
150	151	152	153	154	155	156	157	158	159
160	161	162	163	164	165	166	167	168	169
170	171	172	173	174	175	176	177	178	179
180	181	182	183	184	185	186	187	188	189
190	191	192	193	194	195	196	197	198	199
200	201	202	203	204	205	206	207	208	209
210	211	212	213	214	215	216	217	218	219
220	221	222	223	224	225	226	227	228	229
230	231	232	233	234	235	236	237	238	239
240	241	242	243	244	245	246	247	248	249

Reader Service Card
March-April 1987
Expires June 15, 1987

Please check *only* one box for each of the following questions.

Which microcomputer system do you own/use?

A. ☐ H88
B. ☐ H/Z89-90
C. ☐ H8
D. ☐ H11
E. ☐ H/Z100-110-120
F. ☐ H/Z150-158-160
G. ☐ Z138
H. ☐ Z148
I. ☐ Z171
J. ☐ Z200
K. ☐ Z241
L. ☐ Z248

How did you obtain this copy of *Sextant*?

1. ☐ Subscription
2. ☐ Retail Store
3. ☐ Friend
4. ☐ Single Copy Mail Order
5. ☐ Other

Please rate the articles in this issue for interest and helpfulness, using the key on page 78.

1	2	3	4	5	6	7	8	9	
☐	☐	☐	☐	☐	☐	☐	☐	☐	Excellent
☐	☐	☐	☐	☐	☐	☐	☐	☐	Good
☐	☐	☐	☐	☐	☐	☐	☐	☐	Fair
☐	☐	☐	☐	☐	☐	☐	☐	☐	Poor
☐	☐	☐	☐	☐	☐	☐	☐	☐	Didn't read

Comments _____

_____

_____

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 27346 PHILADELPHIA, PA.

POSTAGE WILL BE PAID BY ADDRESSEE

Sextant Reader Service
P.O. Box 13558
Philadelphia, PA 19101

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 27346 PHILADELPHIA, PA.

POSTAGE WILL BE PAID BY ADDRESSEE

Sextant Reader Service
P.O. Box 13558
Philadelphia, PA 19101

26 Winning Fractals, p. 6
26 Z100 Notebook, p. 17
26 The Programmer's Utility Pack: Useful Tools for the '100 and '150, p. 25
26 C Notes, p. 49
26 Writing Hardware-Independent Terminal Emulators for CP/M and MS-DOS, p. 56

Sorting

3 The World's Fastest Sort?, p. 35
21 See Seven Sorts, p. 73
24 Sorting on Your Terms Rather than the Computer's, p. 51

Speed Modifications/Improvements

3 The World's Fastest Sort?, p. 35
4 Getting There Faster: Benchmarking Math Chip vs. Compiler, p. 62
7 Make Your '8 Think Like an '89—Only Faster, p. 29
10 Graphics Algorithm Optimized for 8080 or Z80, p. 63
12 Dual Speed on Your '89, p. 17
14 TMSI's H-1000: Grafting an 8086 Onto Your '89, p. 17
16 Speed Up Your '100 50%, p. 15
16 A Critical Look at the 8088, p. 75
19 RAM Drives for the '100, p. 21
19 Del Scientific Speeds Up Your '100, p. 63
21 Speeding Up Your '100 or '150 With the 8087 Math Chip, p. 33
24 The Eight-Bit World, p. 25
26 Four Upgrades for the '89, p. 37

Spreadsheet Software, see **Business**

Standard Operating Procedure

9 Disk and File Management, p. 97
10 Take Advantage of Z-DOS Batch Files, p. 79
11 Routinizing Repetitive Reports, p. 80
13 File Naming Conventions, p. 79
14 Two Debugging Tricks for MBASIC, p. 97
15 Z-BASIC Graphics: Using GET and PUT, p. 93
16 Passing Variables with CHAIN and COMMON, p. 101
17 DEBUGging the Z100 Key Click, p. 63
17 Making Z-BASIC More Colorful, p. 106
19 Z-BASIC's CIRCLE Does More Than Draw Circles, p. 102
21 How to Use PROMPT on the '100 and '150, p. 53
22 ROM Monitor Routines of the '100 and '150, p. 33

Suppliers

2 The *Buss* Directory of Independent Suppliers for Heath/Zenith Users, Revision 6, p. 63
3 Putting the "O" in "OEM": Magnolia Microsystems, p. 25
4 T & E associates: "Just Home Folks" Implementing HDOS Utilities, p. 57
6 Waldo and Artra, Inc., p. 45
23 FBE Research: A Former Boeing Engineer, p. 9
25 The Eight-Bit World, p. 23

Terminals

2 Zenith Introduces Smart Communications Terminal, p. 43
6 The Z29 Terminal, p. 97

Users' Groups, see also **Conferences and Fairs**

5 A Look at Local Heath Users' Groups, p. 6
5 HUGs: Enjoyable Education, p. 21
5 *Sextant* Survey: Local HUGs, p. 33
5 Helping People: Heath Users and Heath Computers in New Jersey, p. 36
5 1983 Local HUG Directory, p. 44
10 Forming a Local HUG, p. 25
12 Communing by Computer, p. 41
22 C Notes, p. 57

Utilities

—CP/M

1 Print Spoolers: A Background and Reviews of Six Software Products to Break Your Printer Bottleneck, p. 32
6 Letting Lindley Systems Drive Your Epson Printer, p. 55
9 Screen Dump!, p. 61
15 Salvage Memory Contents Under CP/M or MS-DOS, p. 21
17 A Versatile Printer Driver for CP/M, p. 85
18 Heath CP/M Reads Foreign Disks, p. 31
25 C Notes, p. 65
26 Four Upgrades for the '89, p. 37

—HDOS

1 Print Spoolers: A Background and Reviews of Six Software Products to Break Your Printer Bottleneck, p. 32
4 T & E associates: "Just Home Folks" Implementing HDOS Utilities, p. 57
6 Letting Lindley Systems Drive Your Epson Printer, p. 55
9 Screen Dump!, p. 61
19 HDOS Enhancements from T & E, p. 33
19 A Software Clock for HDOS, p. 67
25 Rigging Up a CTRL-P for HDOS, p. 33
26 Four Upgrades for the '89, p. 37

—MS-DOS/Z-DOS

15 Salvage Memory Contents Under CP/M or MS-DOS, p. 21
22 Z100 Notebook, p. 47
23 C Notes, p. 52
25 A C Utility that Does More than PRINT, p. 43
25 C Notes, p. 65
26 Z100 Notebook, p. 17
26 The Programmer's Utility Pack: Useful Tools for the '100 and '150, p. 25

Word Processing Software, see **Editors/Text Processors**

Z-DOS, see **Operating Systems**; see also **Utilities**

Zenith

1 Heath/Zenith Computers: An Interview and Overview, p. 4
1 What's a Company Like Zenith Doing in the Computer Business?, p. 75
3 The H8's Fifth Anniversary: Origins and Outlooks, p. 11
13 The H89's Fifth Birthday: Origins and Outlooks, p. 9
17 ZDS Introduces Five New Computers, p. 12
24 New Life for the Z150 from Gate Arrays, p. 9
26 Zenith: Planning for the Future, p. 13

Miscellaneous

7 Unconfusing the New User, p. 17
9 Guide to Writing for *Sextant*, p. 73
11 Build a Portable Computer Stand, p. 52
12 Index to *Sextant* #1-#12, p. 78
17 The Intelliburner: Software-Controlled PROM Programming, p. 74
20 Index to *Sextant* #1-#20, p. 69

MAXIMUM MEMORY FOR YOUR ZENITH PC

Z-MAX 150 640/704K upgrade for H/Z 150/160 computers; allows use of one or two banks 256K DRAM. EGA compatible. **$24.95**

Z-MEG 150 1.2 MB upgrade for H/Z 150/160 computers; allows use of up to five banks 256K DRAM. EGA compatible version available. **$49.95**

Z-MAX 138 704K upgrade
Z-MAX 148 704K upgrade
Z-MAX 158 704K upgrade
Permits access of maximum addressable memory. **$24.95 each**

Z-MEG 170 1.0 MB upgrade for Z-171; allows maximum use of up to four banks 256K DRAM. **CALL**

No soldering required. All modifications completely reversible. All kits include complete installation instructions, comprehensive trouble-shooting guide, standard 90-day warranty, and RAM-DSK software.

DEALER/DISTRIBUTOR INQUIRIES INVITED

RAM Technology
427-3 AMHERST STREET, SUITE 265
NASHUA, NEW HAMPSHIRE 03063
1 800 662-0070
In Alaska and New Hampshire: (603) 889-0633
HOURS OF OPERATION:
Monday-Friday, 9:00 A.M. - 5:00 P.M. EST

MasterCard VISA

Circle #128 on Reader Service Card

Build a Clock/Calendar for Your '89

Whether you make or buy the printed circuit board, this is an economical realization of a popular accessory.

Charles Horn and Bob Horn

When the Z100 came out, one annoyance immediately became obvious: having to type in the time and date every time the system was booted under the Microsoft Disk Operating System (MS-DOS). FBE Research really did Z100 owners a good turn with their ZCLK clock/calendar board, which made the process automatic.

If you have an H/Z89, however, you're probably running under CP/M—which doesn't let you time- or date-stamp your files. So, having a clock board may not seem important. Still, it would be nice to be able to type TIME and get a display of the current date and time. Moreover, some CP/M programs do expect you to give them the date or time.

You can buy a clock/calendar board for the '89, but the best price we have seen is in the vicinity of $100. Our purpose here is to show you how you can install a full-featured clock/calendar board in your '89 at a much lower cost.

If you are running the Heath Disk Operating System (HDOS) on your '89, a clock/calendar board would permit the system to automatically get the date on bootup. (Toward the end of this article, we discuss writing a program to do this.)

Here, we will provide the design for a basic system, consisting of the clock chip itself, the board and other supporting circuitry, and software to set the clock and display the time and date.

(TIME.ASM in Listing 1 supports the TIME function; typing TIME will get you a display of the date, the day of the week, and the time to the nearest second. TIMESET.BAS in Listing 2 allows you to reset the time and date in the clock chip. These programs are discussed below.)

Software wasn't enough

We run an RCP/M bulletin-board system (BBS) on the H89 under a system called Electronic Mail Exchange (EMX), which requires calendar support for automatic message maintenance. Our BBS also displays time in the CP/M prompt. To get this prompt display, the system reads the clock repeatedly in a tight display loop.

Before going the hardware route with a clock board, we relied on a software clock. It was described in *Sextant* #19, November-December 1985. (See "A Software Clock for HDOS" by Charles E. Horn.) For over a year, we ran with support from a CP/M version of our HDOS software clock/calendar.

Finally, however, we lost patience with having to reset the clock on every system bootup or power failure; we started looking for an economical way to handle date/time with hardware.

So, we designed the clock/calendar board described in this article. It has served us well for nearly a year without any problems (after we resolved an undocumented quirk in software control of the clock chip).

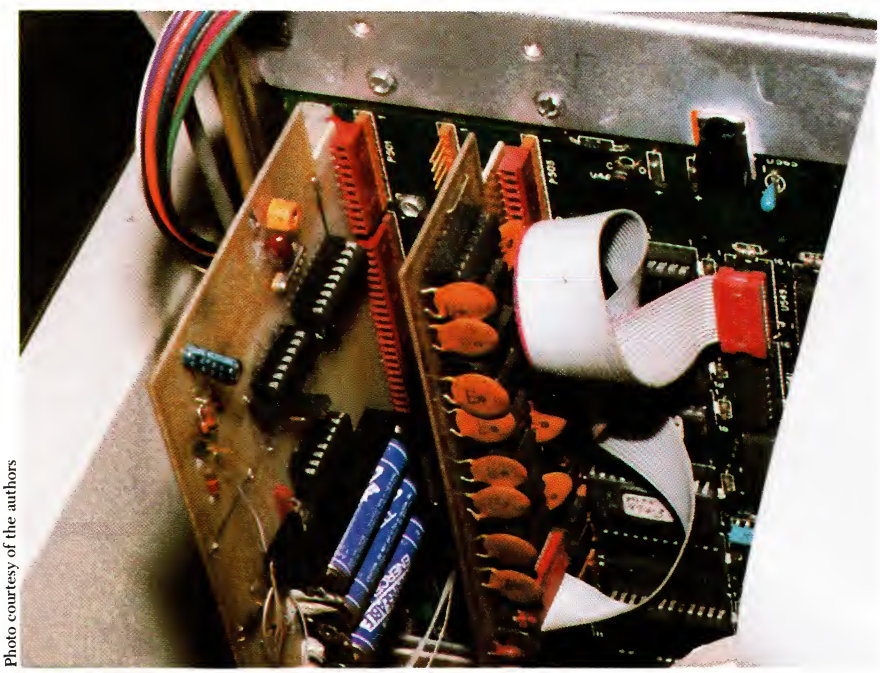


Photo courtesy of the authors

Photo 1. You can build this clock/calendar's circuit board yourself by following the instructions in the article. A bare board, etched and ready for components, can be purchased from the authors. In either case, the board can be mounted in the H89's far left-hand expansion slot.

How simple can a clock board get?

To get the clock/calendar function into your '89, the one basic part you need is the clock itself: we chose Oki Semiconductor's MSM6242 Bus-Connected CMOS Real-Time Clock/Calendar Chip. Other than that, there are a number of minor parts that make up the support circuitry on the clock board. (See Table 1 for a parts list.)

We had looked for a simple real-time clock (RTC) chip for months; there are certainly enough of them. They all keep time; they all keep track of the date; most provide for such niceties as accommodating leap years.

The problem was how to keep the circuit relatively simple; that problem arose

Charles and Bob Horn operate Horn Engineering Associates as a private family business. They primarily offer custom software services for the CP/M and MS-DOS communities.

out of questions of speed.

The RTC chips we looked at were complementary metal-oxide semiconductor (CMOS) devices. Typically, these chips had a slow access time compared to that expected by the Z80, the '89's central processing unit (CPU). A circuit using any of these chips would need to compensate for that difference in speed: in addition to the RTC chip, some form of programmable peripheral interface would be required on the bus lines.

The Oki chip solves the speed problem by providing a built-in address-bus latch that is fast enough to serve the purposes of an interface device. The clock circuit suddenly became very simple. The MSM6242's specifications will permit a direct bus connection at CPU clock rates up to 4 megahertz and possibly higher. So, both the chip and the CPU can read from or write to the latch; it will hold its state until changed by either one.

In short, if you have read, write, and input/output (I/O) request lines available, you'll be able to get the clock/calendar function with no additional circuitry other than the RTC circuit.

The MSM6242 also maintains the day of the week, which many other popular RTC chips will not do. This chip has not been widely promoted, perhaps because it might have some difficulty in meeting all requirements in today's world of 8-megahertz-plus processors.

Part Designator	Description	Manufacturer	Estimated Price (each)
Z1, Z2	74LS32 quad OR-gate	Any	$ 1.50
Z3	MSM6242RS CMOS real-time clock/calendar	Oki [1]	10.00 or less [1]
X1	Miniature quartz crystal, model #CX-1V, 32.768-kHz	Statek	5.00 or less [2]
BH1	Battery holder, two-cell, part #270-398	Radio Shack	.49
BH2	Battery holder, one-cell, part #270-404	Radio Shack	.39
B1, B2, B3	Battery, nicad, size AAA, part #23-127	Radio Shack	4.39 for two
P1	Bus connector, 10-pin, part #432-1074	Heath	2.15
P2	Bus connector, 25-pin, part #432-1076	Heath	4.30
R1, R2	Resistor, carbon, ¼-watt, 220-ohm	Any	
R3	Resistor, carbon, ¼-watt, 10k-ohm	Any	
R4	Resistor, carbon, ¼-watt, 22k-ohm	Any	
C1	Capacitor, electrolytic, 10-microfarad	Any	
C2	Capacitor, glass/mica, 15-picofarad	Any	
C3	Capacitor, variable, 5- to 60-picofarad, part #272-1340 [3]	Radio Shack	1.59
C4, C5	Capacitor, bypass, .01-microfarad	Any	
D1, D2, D3, D5	Diode, 1N914	Any	
D4	Diode, zener, 6.2-volt, 1N753A	Any	
J1	Header, right-angle, 4-pin	Berg type	
P101	Plug, 4-pin	Berg type	

Footnotes:
[1] Call Oki Semiconductors at 408/720-1900 for nearest distributor and price.
[2] Call Statek at 714/639-7810 for nearest distributor. We used an unbranded unit in our prototype from a surplus distributor for $.65.
[3] Used as available. A 5- to 30-picofarad range would improve ease of calibration.

Table 1. Parts list for the clock/calendar board, the HEA RTC-89. The basis of the design described in the article is Oki Semiconductor's MSM6242 CMOS real-time clock/calendar chip. (An etched board, ready for components, is available from the authors.)

What more could you ask?

Before going further, let's see what the Oki chip will do:

- It keeps time in seconds, minutes, and hours—either in 12-hour or 24-hour format.
- It keeps the date in terms of the day of the month, month, and year.
- It keeps track of the day of the week.
- It automatically accommodates leap years.
- It allows you to correct errors of less than ±30 seconds, without completely re-setting the clock.
- It uses a single 5-volt power supply and can be backed up by battery for long periods (months or even years) with the primary power turned off.

In addition, the MSM6242 can be programmed to provide timing interrupts for tasks of your own choosing. (We won't get into this here.)

There is not much more that you could ask. Even though this chip is particularly designed as a multiplexed bus peripheral for the 8085 CPU, it works nicely with the Z80 used in the '89.

Our board will mount in a left-hand expansion slot

If your '89 is like most other survivors, its right-hand I/O expansion area is probably full; but the left-hand memory-expansion area probably has several unused slots.

Unfortunately, the memory slots are not directly supported with I/O read, write, and select lines. Also, you might have noticed that extra I/O-control lines are scarce-to-none.

Never fear—we will show you how to mount your clock/calendar board in a left-hand slot.

What we have to do is decode the needed I/O port addresses. That is, we have to provide circuitry to recognize an attempt to access the clock board's I/O addresses, and to send the appropriate signals to the clock chip. Besides that, we will need to get access to the CPU's buffered read, write, and I/O-request lines.

A "kludge" is required to get control

When the CPU attempts to access a given I/O line, it needs to send out an I/O-control signal and a port-address number. It puts these signals in two places. The 8-bit port number is placed on the same address bus that is used for any attempt to access memory. This is why our I/O can plug into the memory-expansion bus.

However, the '89 provides no similarly easy place to access the I/O-control signals (for read, write, and I/O request). Any particular I/O signal is placed on one of the control lines (RD/, WR/, and IOR/) that go through the control-line buffer chip, U509.

Therefore, we chose to build an adapter to intercept these signals at U509. (At least on the '89A, this chip is situated to the right of the CPU chip near the bottom of the main processor board.)

We must create some I/O ports

The Oki chip is not very sophisticated in port addressing. To set or read the chip's date or time, you must access 16 registers that are addressed as consecutive I/O ports. Thirteen are 4-bit time/date registers and three are 4-bit control registers. (In this chip, time and date values are coded as binary-coded decimal—BCD—digits: each of the ten decimal digits is expressed as simply a 4-bit value.) Each digit in the date/time sequence (D-YY-MM-DD-HH-MM-SS) occupies one of these 4-bit registers.

Port addressing will be no problem. The design of our circuit uses port numbers 00 to 0F hexadecimal, which are not used elsewhere in the '89. All we have to do is decode the port addresses.

Although the memory-address bus recognizes 16-bit addresses, I/O addressing employs only the lower eight address bits. Each bit is carried through an address line numbered zero through seven (A0 - A7). So, the design must decode only these.

Lines A0 through A3 go directly to the RTC chip; depending on the bit values carried, any one of the 16 registers can be selected. (See Table 2 for a listing of the possible values of the four address bits and their effects.)

A4 through A7 are decoded in such a way that they provide the chip-select signal (CS0/) only when all are simultaneously zero (logic low). This decoding is done by the OR gates of Z2—as shown in the schematic diagram in Figure 1.

The OR gates of Z1 are used to provide read, write, and I/O request-control signals to the RTC chip. The RD/, WR/, and IOR/ lines are brought onto the board at J1 by a special harness and integrated-circuit (IC) chip socket adapter that intercepts the control signals at U509.

The kludge

The adapter is made of two low-profile 20-pin IC-chip sockets. Wire-wrap wire leads (about 11 inches long) must be carefully soldered to pins on the upper socket, close against the body. The RD/ line goes to pin 12; WR/ goes to pin 14; and IOR/ goes to pin 9.

The upper socket is then plugged into the lower socket with the leads routed out the upper end (toward pin 1) of the assembly. The chip at U509 is removed and plugged into the adapter. The entire assembly then goes back into the U509 socket.

The low-profile sockets are important here to assure clearance when the CPU board is mounted in the cabinet.

A 4-pin Berg-type plug (P101) goes on the other end of the three-wire harness. This plug goes to J1 on the clock board. To prevent an accidental upside-down connection, we clipped off the unused pin on J1 and placed a key plug in the corresponding hole on P101.

Keep time when power is off

Some care has been taken in the design of the power supply. The battery-backup provision requires isolation from the primary source. It is wise to maintain the power voltage to a CMOS device at the maximum likely input logic levels (5 volts), at least as long as main power is applied.

To provide a full 5-volt supply and still provide isolation from the battery, the design derives power voltage from the 12-volt supply, dropped through resistor R1. (See Figure 1.) The diode D1 clamps the voltage to the main 5-volt supply to create a voltage of about 5.6 volts. The diode D2 drops this voltage to 5 volts and provides battery isolation. The 6.2-volt zener diode D4 protects the clock chip from damage if the 5-volt clamping supply should become disconnected. Power for the on-board logic comes from the main 5-volt supply.

The rechargeable battery consists of three "AAA" nicad cells, which are readily available at a favorable price. With power on, the batteries are continuously on

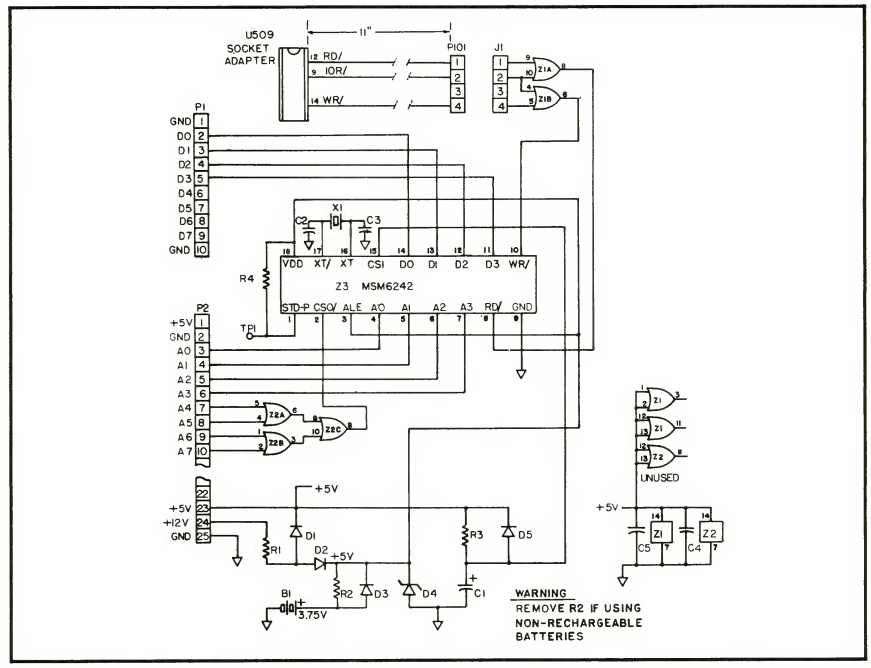


Figure 1. Schematic diagram for the HEA RTC-89 clock/calendar board. At the top, you can see the Read, I/O Request, and Write lines. Address lines A0–A3 are used to select one of the chip's 16 internal registers. Time and date values are carried to and from the chip through data lines D0–D3.

Address	Address Bits A3	A2	A1	A0	Register Function	Register Name	Data Bits D3	D2	D1	D0
00	0	0	0	0	1-second digit (0-9)	S1	S8	S4	S2	S1
01	0	0	0	1	10-second digit (0-5)	S10	*	S40	S20	S10
02	0	0	1	0	1-minute digit (0-9)	Mi1	Mi8	Mi4	Mi2	Mi1
03	0	0	1	1	10-minute digit (0-5)	Mi10	*	Mi40	Mi20	Mi10
04	0	1	0	0	1-hour digit (0-9)	H1	H8	H4	H2	H1
05	0	1	0	1	10-hour digit (0-3)	H10	*	p.m./a.m.	H20	H10
06	0	1	1	0	1-day digit (0-9)	D1	D8	D4	D2	D1
07	0	1	1	1	10-day digit (0-3)	D10	*	*	D20	D10
08	1	0	0	0	1-month digit (0-9)	Mo1	Mo8	Mo4	Mo2	Mo1
09	1	0	0	1	10-month digit (0-1)	Mo10	*	*	*	Mo10
0A	1	0	1	0	1-year digit (0-9)	Y1	Y8	Y4	Y2	Y1
0B	1	0	1	1	10-year digit (0-9)	Y10	Y80	Y40	Y20	Y10
0C	1	1	0	0	week digit (0-6)	W	*	W4	W2	W1
0D	1	1	0	1	Control register D	CD	30SEC ADJ	IRQ FLAG	BUSY	HOLD
0E	1	1	1	0	Control register E	CE	T1	T2	IRPT/ STD	MASK
0F	1	1	1	1	Control register F	CF	TEST	24/12	STOP	REST

Notes: REST = RESET
IRPT/STD = INTERRUPT/STANDARD
* Bit unrecognized during a write and held at zero during a read. Program must mask the a.m./p.m. bit when processing 10's hours data. BUSY bit is read only. The IRQ FLAG bit can only be set to a "0". Setting the IRQ FLAG to a "1" is done by hardware. Data taken from Oki MSM6242 Application Note dated June 1985.

Table 2. Registers of Oki's MSM6242 chip. The bit values of address lines A3–A0 select one of the chip's 16 internal registers. So, a value of 0100 binary for A3–A0 selects the H1 register, which holds the 1-hour digit value; if data lines D3–D0 (H8 H4 H2 H1) carry 0101b, the value of the 1-hour digit is 5.

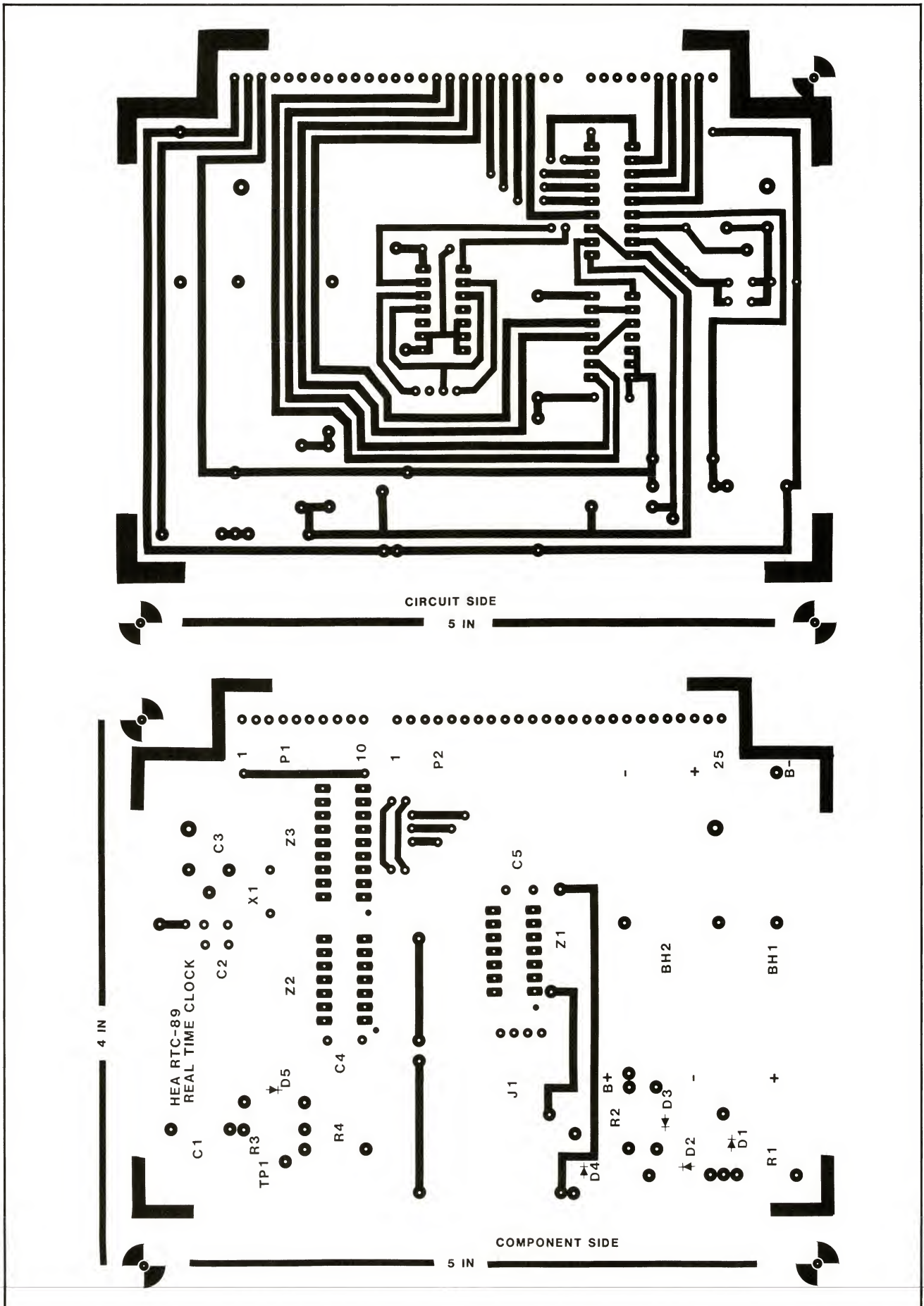


Figure 2. Camera-ready artwork of the component side (bottom) and the circuit side (top) of the printed-circuit board. If you do not have access to facilities for photographically etching a board, the circuit may also be built using an ordinary wire-wrap board, or you may purchase an etched board from the authors. (See text.)

charge through R2. When primary power is removed, the battery supplies power through diode D3.

Since the standby power's current is very low (a few microamps), ordinary dry cells may be substituted for the nicad cells. If so, the charging resistor, R2, *must be removed from the circuit.*

The chip-select line, CS1, is used to de-select the chip if a main 5-volt power failure occurs. When de-selected in this manner, the chip will continue to maintain the correct time. The R3-C1 time constant provides a turn-on delay to assure that all logic levels are stable before the chip is enabled. Diode D5 provides a rapid discharge path for C1 when the primary supply voltage is removed. This action will de-select the chip immediately as the 5-volt supply goes down. De-selecting the clock chip protects its registers from logic-level transients that might change their contents.

Anything else?

As noted above, time and date values are expressed as BCD digits, which use only four data bits; four data lines, numbered zero through three (D0 - D3) are provided by the connector P1 (the upper slot connector). These bits are connected directly to the chip's 16-bit data bus. Other data bits on the bus are simply ignored.

As discussed above, address bits A0 through A3 are connected directly to the chip to select among the 16 internal registers (ports).

The master clock oscillator is a built-in chip function, controlled by the crystal X1. A standard 32.768-kilohertz clock crystal is used, trimmed to frequency by C3. Calibration can be accomplished either by trial and error or by setting the frequency at the test point, TP1, to precisely 64 hertz after the clock has been initialized and set.

Put it all together

The RTC is built on a printed-circuit (PC) board as illustrated in the photograph of our prototype board. Notations for the parts layout of the finished design can be seen in the camera-ready artwork for the component side of the board. (See Figure 2.)

This board is designed such that it can be etched as a two-sided board with either plated-through or "Z-wire" feedthroughs. It can also be etched as a single-sided board, using jumper wires to form the component-side wiring. It can be mounted in any left-side expansion slot.

The components face to the right when mounted, only because our home-grown memory-expansion board is made that way.

The only components that require special mounting attention are the battery holders. They are simply glued down with RTV silicon sealant, but they may be further secured by bus wires at the pads provided. These pads will line up with

Listing 1. TIME.ASM. The calendar board itself will keep the time, but you'll need software to access the information it holds. This program is written for use under the CP/M operating system. It will display the date, day of the week, and time (to the nearest second).

```
;*************************************************************
;* TIME.ASM - A routine to read the time from the HEA-89 RTC and *
;* display time, date, and day of the week to the screen.      *
;* Charles Horn - 11/25/85                                     *
;*************************************************************
;
;       PORT EQUATES FOR THE CLOCK BOARD
;
        RTCPORT EQU     ØØ      ;base port for RTC board
;
        S1PORT  EQU     RTCPORT         ;units seconds port
        S1ØPORT EQU     RTCPORT+1       ;tens seconds port
        M1PORT  EQU     RTCPORT+2       ;units minutes port
        M1ØPORT EQU     RTCPORT+3       ;tens minutes port
        H1PORT  EQU     RTCPORT+4       ;units hours port
        H1ØPORT EQU     RTCPORT+5       ;tens hours port
        D1PORT  EQU     RTCPORT+6       ;units days port
        D1ØPORT EQU     RTCPORT+7       ;tens days port
        MO1PORT  EQU    RTCPORT+8       ;units month port
        MO1ØPORT EQU    RTCPORT+9       ;tens month port
        Y1PORT  EQU     RTCPORT+1Ø      ;units years port
        Y1ØPORT EQU     RTCPORT+11      ;tens years port
        DOWPORT EQU     RTCPORT+12      ;day of week port
        CDPORT  EQU     RTCPORT+13      ;control port D
        CEPORT  EQU     RTCPORT+14      ;control port E
        CFPORT  EQU     RTCPORT+15      ;control port F
;
;       COMMON EQUATES
;
        BDOS    EQU     ØØØ5H
        CONIN   EQU     1       ;Console input function
        CONOUT  EQU     2       ;Console output function
        PBUF    EQU     9       ;Print buffer function
        CONBUF  EQU     1Ø      ;Read console buffer function

        CR      EQU     ØDH
        LF      EQU     ØAH
        BELL    EQU     Ø7H
;
        ORG     1ØØH
;
START:  LXI     H,Ø             ;locate stack pointer
        DAD     SP
        LXI     SP,STACK        ;put CP/M SP on our stack
        PUSH    H               ;...for quiet return
;
;       Check to see if clock is active.  If not - system will
;       hang.  Writes to CE register, then reads back to verify
;       that RTC board is there.  If so - replaces original
;       contents.
;
CHECKIT:
        IN      CEPORT          ;read CE reg
        ANI     ØFH             ;keep low nibble
        MOV     B,A             ;save in B
        CMA                     ;complement it
        DAA                     ;make BCD
        ANI     ØFH             ;keep low nibble
        MOV     C,A             ;save in C
        OUT     CEPORT          ;write to clock
        IN      CEPORT          ;read it back
        ANI     ØFH             ;keep low nibble
        CMP     C               ;same as written?
        JNZ     ERROR           ;if not - clock not present
        MOV     A,B             ;else - retrieve original value
        OUT     CEPORT          ;..and put it back
        JMP     READRTC         ;and read the clock
;
ERROR:
        MVI     C,PBUF          ;show error
        LXI     D,ERRMSG
        CALL    BDOS            ;..and quit
;
EXIT:   POP     H               ;recover entry SP
        SPHL                    ;set it
        RET                     ;exit w/o wboot
;
;       Read the RTC clock to RTCBUF for display
;
READRTC:
        IN      CDPORT          ;read status of IRQ
        ANI     ØØØØØ1ØØB       ;wait for it to be zero state
                                ;..MSM6242 might hang if not
        JNZ     READRTC         ;if not zero
;
        LXI     H,RTCBUF        ;point to time buffer
        MVI     A,ØØØØØ1Ø1B     ;set IRQ flag and HOLD mode
        OUT     CDPORT
RDYLOOP:
```

➔

INTELLIBURNER

EPROM–EEPROM–MICROCOMPUTER PROGRAMMER

UNIVERSAL PROGRAMMING CAPABILITIES AT AN AFFORDABLE PRICE

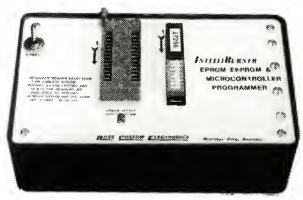
- **Ultra Fast Programming – 2716's in 16 Seconds**
- **Programs & Verifies 8K thru 256K Single Voltage EPROMs**
- **Erases, Programs & Verifies 2815, 2816 & 2817 EEPROMs**
- **Programs & Verifies 8748 and 8751 Series MICROCOMPUTERS***
- **Programming Characteristics Selected by Convenient Personality Jumper Plug (DIP Header)**
- **Program, Verify, Status, & Diagnostic Display with Tricolor LED**
- **Serial Interface — 3, 4, or 5 wire — 1200 to 19200 Baud**
- **Supports ACK/NAK, XON/XOFF and READY/BUSY Protocols**

NO SPECIAL SOFTWARE REQUIRED. Transfer disk files (Intel Hex or Motorola 'S' Format) to EPROM with your system's line printer or modem software. Transfer EPROM contents to disk file with your system's modem software. Or use the supplied software ** to transfer any binary or ASCII file to/from EPROM.

PROGRAMS:

NEW EXPANDED FIRMWARE FOR 27512 & 27513 EPROMs AND 2864 EEPROMs

*Requires optional adapter



SOFTWARE AVAILABLE FOR: **

CP/M systems on 8" SSSD – many 5¼ formats
TRS-80 Model I & III TRSDOS – NEW! TRSDOS 6.X
Heath H8/H89 HDOS & CP/M
ZENITH Z90 & Z100 CP/M – Z100 ZDOS – Z150
KAYPRO II/IV/10/16/286/2000
IBM PC, PC/XT, AT – many MS-DOS systems

IntelliBurner Programmer with Software	$ 299.00
Stand-Alone RAM OPTION with 64K Bit RAM (Expandable to 256K Bit)	89.00
RS-232 Interconnect Cable	12.00
IntelliBurner PC Boards, EPROM, Plans & Software	99.00

Low Cost "DumBurner" serial programmers harness the power of your personal computer with the supplied software for full programming capabilities:

DumBurner II Programmer for 28 Pin and 24 Pin EPROMs and EEPROMs (with Software)	$ 199.00
DumBurner II Bare PC Board, Plans & Software	59.00
16K/32K DumBurner for 24 Pin EPROMs (with Software)	149.00
16K/32K DumBurner PC Board, Plans & Software	39.00

ROSS CUSTOM ELECTRONICS
INCORPORATED
1551 Sandra Drive
Boulder City, Nevada 89005
PHONE (702) 293-7426

! ! NOW SHIPPING with ALL 'BURNERS ! !
TOOLKIT Software for Editing EPROM Information, Plus HEX/MOTOROLA 'S'/Binary File Conversion Utilities

Ultra Violet Products EPROM Erasers
Model DE-4 - Holds 8 EPROMS - Special Prices

Add $3 Shipping & handling, ($2 Bare Boards), C.O.D.'s accepted; Foreign Orders add required postage. Specify Environment and Media Requirements
H8, H89, Z100 are ™ Heath/Zenith; CP/M is ™ Digital Research. TRS-80 is ™ Tandy Corp.; IBM-PC, PC/XT, AT are ™ IBM; MS-DOS is ™ Microsoft.

Circle #160 on Reader Service Card

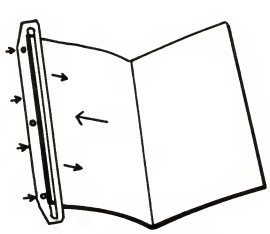
Sextant Binder Interface Kits

Now you can interface your copies of *Sextant* to a 3-ring binder! Tough plastic Magazine Holders let you preserve, protect, and organize your copies of *Sextant* without drilling holes in them.

Each package of 12 holders costs only $2.95. To order yours, return the coupon with your payment today to Sextant Publishing Co., 716 E Street, S.E., Washington, DC 20003.

Instructions

1. Open magazine to center.
2. Slip pages through slot in magazine holder.
3. Slide holder to center of magazine.
4. Place magazine in any standard 3-ring binder.



I want 3-ring binder "holes" for my copies of *Sextant*!

Send me _____ packages of 12 magazine holders $2.95 each. Please add $.75 to your total order for shipping and handling.

☐ Payment is enclosed. (Checks must be in U.S. dollars payable on a U.S. bank.)

☐ Charge my ☐ Visa ☐ MasterCard

Card # _____ Expires _____

Name _____

Address _____

Send your order to Sextant Publishing Co., 716 E Street, S.E., Washington, DC 20003

UP YOUR RAM

AND OTHER H/Z DISCOUNT ENHANCEMENTS

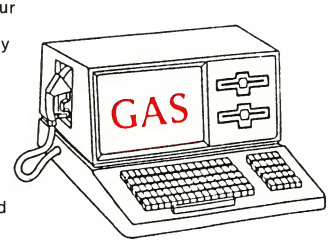
256K D-RAMS 150ns: 9/$22, or package priced as shown
120ns for Z240 - 9/$25, 100ns for Z248 - 9/$30
Z-100 Motherboard kit to maximize memory to 768K, Z-MAX only $49, with 27 256K RAM's for $111.
ZMF100a by FBE, old Z-100 NO WIRE kit, $59, $122 w/27
Z-100 RAMBOARD by UCI, new version for 192K or 768K, 8mhz, RAMDISK software, .5MB/$399, 2MB/$519.
Z205 Upgrade Kit to use 256K's creating 1MB RAMDISK, wiring required, $44, $109 w/27 RAM, $129 w/36 RAM
Z-150/160 640/704K Upgrade using PAL chip for $19, with 18-256K DRAMS, $59
1.2MB using PAL & 5 banks 256K with RAMDISK software as reviewed by REMark 8/86, $149, $109 w/3 banks 256K's, $44 w/no RAM, specify system memory of 640 or 704K.
Z-148 PAL to utilize 704K instead of 640K, $19, $59 w/18
Z-200 Memory Board, 128K/serial/parallel expandable to 1-1/8MB or 2-5/8MB, base price $269

EASY PC - UCI's three board set for complete IBM hardware/software compatability, $479.
ZVM135 cable with intensity control for 16 IBM colors, $23
Utility disk with drivers, communications, diagnostics, $40
I/O board with single IBM COM port, $89, with 2 COM ports, game port & clock, $119
ZPC HARDWARE UPGRADE - circuitry added to multi-port I/O board, $169, with ZPC software in ROM, $209
NEW UCI PRODUCTS - check on availability of the following: EasyMATE 8" & cross partition drivers, EasyWIN winchester interface, LANlink network software & hardware, Expansion chasis for PC, Z148, Z100, improved RAMSAVER, etc.
MATH CO-PROCESSOR SUPPORT, UCI daughter board for use with Easy PC or plain Z-100 motherboard. $66
8087-2 math chip, 8mhz, $155. UCI board & chip, $211.
80287-3, Math chip for Z-200, 6mhz, $179

HARD DISK UPGRADES - CDR's 317 SCSI disk controller for Z-100, 2 card kit with hardware/cables, $555 packaged with 20MB/$888, 30MB/$988, 40MB/$1088, S-100 card only with SCSI 20MB drive, $799
HIGH DENSITY CONTROLLER card for PC clones by Adaptec, "RLL" format increases capacity 50%, $149 packaged with 30MB hard disk for $499, 45MB/$649 with 60MB, 40MS access, half high by NEC for $899

OTHER PRODUCTS:
V-20 by NEC for faster 8088 execution, 8mhz version, $14.
V-30 by NEC for faster 8086 execution, 8mhz version, $19.
Z-100 speed-up kit, 7.5mhz by CDR, $39
CLOCKS - SMARTWATCH ROM socket plug-in for Z-100 & PC's, $39
1.2MB 5-1/4" floppy drive, $149, cable for Z-100, $30
2400 baud Anchor Lightning ext. modem, "HAYES", $299

We specialize in the unusual, state of the art upgrades. Our prices reflect the current market as of 1/1/87, but they are subject to change up or down, especially the RAM prices. Quantity Discounts available. P.O.'s accepted from government, schools, and large corporations. Shipping and handling charges are $5 for small chip kits, $10 for large board sets, etc. add extra $5 for P.O.'s, COD's, & A.P.O.'s.



GRAYMATTER APPLICATION SOFTWARE
1601 TOWNSHIP LINE ROAD
NORRISTOWN, PA 19401-1146
(215) 279-4460
BOB GRAY

WE VISIT MOST REGIONAL HUG CONFERENCES

Circle #131 on Reader Service Card

holes in the recommended battery holders. A bus wire with a knot on one end can be passed through each hole in the holders, pulled tight, and soldered to the pad. Since the board is retained in place only by the friction of the connectors, the batteries are placed as low and as close to the bus connectors as possible; this is to prevent their weight from causing the board to be pulled loose from the bus connectors. (The connectors, though, are usually very secure.)

Photo 1 shows our prototype board mounted in the far left-hand slot, which provides maximum access to the frequency-adjustment capacitor.

Notice that there are a couple of spare parallel mounting holes for capacitor C2. You might find that your crystal cannot quite be tuned down to 64 Hz, causing your clock to run fast. If so, place another 15-picofarad capacitor in this spare position to bring the trimmer capacitor, C3, into range.

Also note the three-hole pattern for C3. This is just to allow you to use any of a variety of capacitors, depending upon availability.

How about the parts and their cost?

Only a few of the parts are particularly critical. Table 1 is a selected parts list with possible sources and typical prices for each. Prices are sure to vary, depending upon parts sources. You may be able to get a few from your junk box.

Battery variations

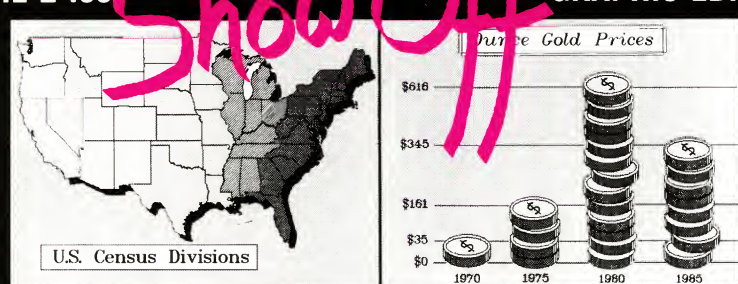
As noted, we designed the board to use "AAA" nicad batteries, permitting the use of ordinary cells as an alternative. Ordinary cells should last through their entire shelf life in this application.

If you use ordinary batteries, we would recommend common carbon-zinc cells over alkalines. Their low-drain shelf life tends to be longer, and they tend to do less damage when they leak. You might

```
        IN      CDPORT          ;wait till not busy
        ANI     00000010B       ;mask BUSY bit
        JNZ     RDYLOOP
        IN      S1PORT          ;read units seconds
        CALL    READIT          ;move to buffer
        IN      S10PORT         ;read tens seconds
        CALL    READIT          ;move to buffer
        IN      M1PORT          ;read units minutes
        CALL    READIT
        IN      M10PORT         ;read tens minutes
        CALL    READIT
        IN      H1PORT          ;read units hours
        CALL    READIT
        IN      H10PORT         ;read tens hours
        CALL    READIT
        IN      D1PORT          ;read units days
        CALL    READIT
        IN      D10PORT         ;read tens days
        CALL    READIT
        IN      MO1PORT         ;read units months
        CALL    READIT
        IN      MO10PORT        ;read tens months
        CALL    READIT
        IN      Y1PORT          ;read units years
        CALL    READIT
        IN      Y10PORT         ;read tens years
        CALL    READIT
        IN      DOWPORT         ;read day of week
        CALL    READIT

        XRA     A               ;set hold off
        OUT     CDPORT          ;let clock go

        Set up the display buffer

        LXI     H,RTCBUF        ;point to clock data
        DCX     H               ;set up for call
        CALL    GETIT           ;get binary and make ascii
        STA     SECMSG+1        ;units seconds
        CALL    GETIT
        STA     SECMSG          ;tens seconds
        CALL    GETIT
        STA     MINMSG+1        ;units minutes
        CALL    GETIT
        STA     MINMSG          ;tens minutes
        CALL    GETIT
        STA     HORMSG+1        ;units hours
        CALL    GETIT
        STA     HORMSG          ;tens hours
        CALL    GETIT
        STA     DAYMSG+1        ;units day of month
        CALL    GETIT
        STA     DAYMSG          ;tens day of month
        LXI     H,Y1BUF         ;point to year buffer
        DCX     H               ;set up for call
        CALL    GETIT
        STA     YERMSG+1        ;units year
        CALL    GETIT
        STA     YERMSG          ;tens year
;
        LXI     H,DOWTBL        ;point to day of week table
        LDA     DOWBUF          ;get binary day of week
```


INTRODUCING 640 x 480 HIGH RES
FOR THE Z-100 ShowOff GRAPHIC EDITOR

Now, you can improve your presentations and reports. Use ShowOff, THE hi-res, graphics program for the Z-100. Easy to use, ShowOff will help you draw, paint and add text to create outstanding graphics.



With ShowOff, your Z-100 will outperform all popular PC graphic systems.
ShowOff offers:
- 640 x 480 resolution
- 92 fill colors
- 92 patterns
- 25 text styles
- compatibility with other graphic programs

ShowOff $79 • demo disk $3 • ShowOff with Logitech Mouse $169
also available for digitizing pads

ShowOff minimum requirements: Z-100 • color video memory • 384K RAM • MS-DOS 2.0 or higher

HOGWARE

HOGWARE COMPANY
470 BELLEVIEW • ST. LOUIS, MO 63119
(314) 962-7833

ORDER DIRECT • VISA • MASTERCARD • CHECK • Dealer Inquiries Welcome

Circle #144 on Reader Service Card

```
        CALL    MUL1Ø           ;compute index into DOW table
        LXI     D,Ø             ;clear DE
        MOV     E,A             ;index in DE
        DAD     D               ;HL now points to DOW string
        LXI     D,DOWMSG        ;DOW space in output
        MVI     C,1Ø            ;1Ø bytes to move
        CALL    MOVE            ;move DOW into message
;
        LDA     MO1ØBUF         ;get binary tens month
        CALL    MUL1Ø           ;compute 1Ø * tens month
        MOV     C,A             ;save tens * 1Ø in C
        LDA     MO1BUF          ;get binary units month
        ADD     C               ;binary month now in A
        DCR     A               ;set up for index into month table
        CALL    MUL1Ø           ;compute index into month table
        LXI     H,MONTBL        ;point to month table
        LXI     D,Ø             ;clear DE
        MOV     E,A             ;index to DE
        DAD     D               ;HL points to month string
        LXI     D,MONMSG        ;month space in message
        MVI     C,1Ø            ;1Ø char to move
        CALL    MOVE            ;into message
;
;       Output message now complete - print it
;
        LXI     D,OUTMSG        ;point to message
        MVI     C,PBUF          ;print it
        CALL    BDOS
        JMP     EXIT            ;all done
;
;*************************
;*      SUBROUTINES      *
;*************************
;
;       READIT - Reads clock ports into the RTC buffer.
;       On entry, HL points to position in Buffer.
;
READIT: ANI     ØFH             ;keep low nibble
        MOV     M,A             ;value to buffer
        INX     H               ;point to next position
        RET
;
;       GETIT - Gets a value from RTC buffer and converts
;       it to ascii.  On entry, HL points ahead of position
;       in buffer.
;
GETIT:  INX     H               ;point to position in RTC buffer
        MOV     A,M             ;get value there
        ADI     'Ø'             ;make it ascii
        RET
;
;       MUL1Ø - multiplies the byte in A by ten.  Returns
;       binary result in A.
;
MUL1Ø:  MOV     C,A             ;original byte to C
        ADD     A               ;A * 2
        ADD     A               ;A * 4
        ADD     A               ;A * 8
        ADD     C               ;A * 9
        ADD     C               ;A * 1Ø
        RET
;
;       MOVE - Moves (HL) to (DE).  Number of bytes in C.
;
MOVE:   MOV     A,M             ;get byte from (HL)
        STAX    D               ;put in (DE)
        INX     H               ;next from
        INX     D               ;next to
        DCR     C               ;countdown
        JNZ     MOVE
        RET
;
;****************************
;*      SCREEN MESSAGES     *
;****************************
;
ERRMSG: DB      CR,LF,'Sorry...RTC Board not active...'
        DB      CR,LF,LF,'+++ Exit to CP/M +++',CR,LF,LF,'$'
;
OUTMSG: DB      CR,LF
HORMSG: DB      'HR:'                   ;these dummy values filled
MINMSG: DB      'MN:'                   ;..in by program.
SECMSG: DB      'SC '
DOWMSG: DB      'DOW ',Ø,Ø,Ø,Ø,Ø,Ø
DAYMSG: DB      'DA-'
MONMSG: DB      'MON ',Ø,Ø,Ø,Ø,Ø,Ø,'19'
YERMSG: DB      'YR'
        DB      CR,LF,'$'
;
;*****************************
;*      PROGRAM STORAGE      *
;*****************************
;
;       The RTC buffer
```

➔

also consider mounting a holder for a lithium button-cell, such as the Sanyo CR2430. It is not rechargeable, but it is considerably smaller in size and weight, and has an extremely long shelf life.

Some software is required to make it work

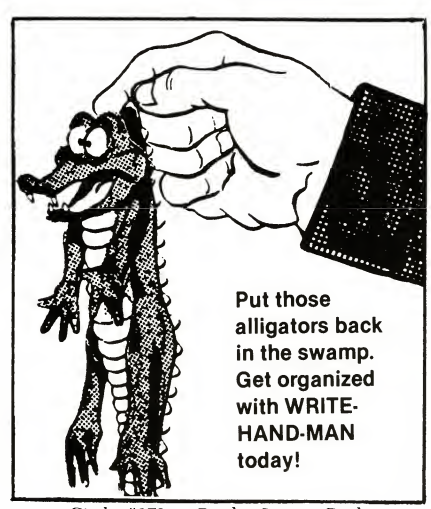
Now, all that is needed is some software to access the clock.

Basic register information for the Oki chip is shown in Table 2. Additional application data is available from Oki Semiconductors and their distributors. Oki's application note describes exactly how each register should be handled. Oki does not provide examples of suitable assembler software.

Here, we will simply describe software to set and read the clock. Our contributions are the assembly-language program TIME.ASM, and the BASIC program, TIMESET.BAS. TIME (Listing 1) can be used to display time (in 24-hour format), date, and day of the week on the screen; TIMESET (Listing 2) can be used to set the clock.

The TIME.ASM program does only the basic task of reading the clock and displaying time, date, and day of the week. You are on your own for the fancy tricks, such as including hours and minutes in your system prompt.

There is no reason that the routine to read the clock could not be incorporated in other programs as needed. It could be expanded into a resident CP/M system



Circle #173 on Reader Service Card

Wondering how many issues are left on your subscription?

0.00 30638 23JL 275 -->28

The rightmost number in the top row of your address label indicates the last issue on your subscription. In the sample above, the last issue number is 28, indicating that the subscription ends with the May-June 1987 issue of *Sextant*.

extension (RSX) or HDOS device driver to make the time string available in memory for any running program to access. In either case, you can use the '89's 2-millisecond clock interrupt in order to allow your program to periodically read the clock registers into memory.

The TIMESET.BAS program will bring up a prompt for entry of the time, date, and day of the week. (It will not permit an entry in an invalid format.) After these entries, the program waits until the current seconds value time advances to the entered value. At that time, hitting RETURN will cause the clock to re-start at the new time.

HDOS support?

Although the TIME.ASM program is written to assemble under CP/M, a similar program can be written to work under HDOS. (You might also make a system patch to cause the boot process to bypass prompting the user.)

We have recently written the HDOS-support program, and the same techniques that TIME uses to read the clock can be used in an HDOS program to automatically enter the date into memory. If you name the program PROLOGUE.SYS and include it on your bootable system disk, HDOS will automatically execute it when the boot process is complete.

When you boot HDOS, the operating system extracts the last date entered on the disk's system track and displays it. It then waits for you either to enter a

```
;
RTCBUF  EQU     $
S1BUF   DS      1
S1ØBUF  DS      1
M1BUF   DS      1
M1ØBUF  DS      1
H1BUF   DS      1
H1ØBUF  DS      1
D1BUF   DS      1
D1ØBUF  DS      1
MO1BUF  DS      1
MO1ØBUF DS      1
Y1BUF   DS      1
Y1ØBUF  DS      1
DOWBUF  DS      1
;
;       Day of week table - all entries null filled to 1Ø bytes
;
DOWTBL: DB      'Sunday ',Ø,Ø,Ø
        DB      'Monday ',Ø,Ø,Ø
        DB      'Tuesday ',Ø,Ø
        DB      'Wednesday '
        DB      'Thursday ',Ø
        DB      'Friday ',Ø,Ø,Ø
        DB      'Saturday ',Ø
;
;       Month table - all entries null filled to 1Ø bytes
;
MONTBL: DB      'January ',Ø,Ø
        DB      'February ',Ø
        DB      'March ',Ø,Ø,Ø,Ø
        DB      'April ',Ø,Ø,Ø,Ø
        DB      'May ',Ø,Ø,Ø,Ø,Ø,Ø
        DB      'June ',Ø,Ø,Ø,Ø,Ø
        DB      'July ',Ø,Ø,Ø,Ø,Ø
        DB      'August ',Ø,Ø,Ø
        DB      'September '
        DB      'October ',Ø,Ø
        DB      'November ',Ø
        DB      'December ',Ø
;
        DS      32              ;Our 16 position stack
STACK   EQU     $
        END
;
```

→

MicroSystems Call

Z-100 ⟷ VAX ⟷ Z-150/IBM PC

Communications Software

COMPLETE COMMUNICATIONS

- Unmatched VT-100 emulation including true 132-column, double-high, and double-wide characters.
- Error-free file transfers with XMODEM protocol.
- Communicate with VAX computers, other PCs, or information utilities such as The Source℠, CompuServe™, DELPHI™, NewsNet™ or MCI Mail℠.

EASY-TO-USE

- Scripts, keyboard macros, and Hayes auto-dialing simplify your routine communications tasks.
- "Hot-key" leaves your DOS only a keystroke away.
- Lotus™-style menus are simple to learn and use, yet never get in your way.

VALUE

- Introductory price of $49 For your Z-100, Z-150, Z-200, IBM™ PC, or compatible.
- Not copy-protected. 60-day guarantee.
- Send this coupon today!

YES! I want complete communications, send me ____ copies of Call at the introductory price of $49 each.
Please include $1.50 for shipping, California residents add $3.43 sales tax.
NAME: _____
ADDRESS: _____
CITY: _____ STATE: _____ ZIP: _____
Mail to: **MicroSystems Company** (408) 358-2224
16987 Frank Ave., Dept. 63, Los Gatos, CA 95030

Circle #101 on Reader Service Card

FLEXI-GRAPH — VERSION 2.0

NOW ALSO SUPPORTS

EGA

AND

TURTLE GRAPHICS

Libraries based on TEKTRONIX and CORE graphics standards. Over 100 routines provide a wide variety of high speed graphics capabilites.

Callable from:

MS-FORTRAN
MS-PASCAL
Many C Compilers

(Includes source code for high level language interface routines)

STILL SUPPORTS **Z-100, Z-150 and IBM PC**

For Only $99

(Plus $5 for Shipping & Handling)

(Extensive Demo Disk—$3)

NEW ORLEANS GENERAL DATA SERVICES, INC.
7230 Chadbourne Drive
New Orleans, LA 70126
(504) 241-9495

MasterCard VISA

RETURN to confirm that the displayed date is correct or to enter a new date. The current date is then written back to the disk.

During this process, the current date is written in a nine-byte ASCII string in the exact format as entered (DD-MMM-YY). The nine-byte string is written into reserved memory at a location called S.DATE (at address 040.277A). When files are written to disk, the date tag comes from this location.

The date is also encoded into a 16-bit word and entered at a location called S.DATEC (at 040.310A). This is entered 1's byte first (as with an SHLD instruction).

The format of this word is:

0-YYYYYY-MMMM-DDDDD

Here, the highest bit is zero; the "Y" field is the binary value of the two-digit year, minus 70; the "M" field is the binary value for the month (1-12); and the "D" field is the binary value for the day of the month (1-31).

To cause the date to be automatically entered into these locations, you could enter RETURN at the date prompt, and accept whatever the date might be. The boot would then be completed.

The trick is to write a program that will read the clock, encode the date in the appropriate format, and upgrade the contents at S.DATE and S.DATEC.

The only "catch" to using this PROLOGUE.SYS strategy is that the current date will not be automatically written back to the system disk, as it would have been during the boot process. However, the date on the disk is probably no longer important.

If you are running SoftShop's SYSMOD, you would be able to write the PROLOGUE program in BASIC. You can use SYSMOD's DOCOM feature to create a PROLOGUE.SYS batch file that will automatically load BASIC, then execute your program to poke the time data into memory.

```
10 '
20 ' TIMESET.BAS - Sets the time on the HEA-RTC Real Time Clock
30 '
40 '                                        Bob Horn
50 '
60 '
100 DEFINT A-Z                          ' We'll use all integers
110 DIM DOW$(6)                         ' Define array to read days of the week
120 FOR N = 0 TO 6: READ DOW$(N): NEXT N  ' Get days of week in DOW$
130 LINE INPUT "Enter time (HHMMSS):  "; T$
140 IF LEN(T$)<>6 THEN 130              ' Check the length of T$
150 LINE INPUT "Enter date (YYMMDD):  "; D$
160 IF LEN(D$)<>6 THEN 150
170 DT$ = D$+T$                         ' Define string for set routine
180 GOSUB 1000                          ' Compute day of the week
190 '
200 PRINT: PRINT DOW$(DOW);             ' Print time/date...day of the week
210 PRINT ", ";MID$(D$,3,2);"/";RIGHT$(D$,2);"/";LEFT$(D$,2); ' Date
220 PRINT " | "; LEFT$(T$,2);":";MID$(T$,3,2);":";RIGHT$(T$,2) ' Time
230 PRINT: PRINT "Press any key to set clock: ";: Z$=INPUT$(1)
240 '
250 ' Here we actually set the clock.  Define ports used
260 '
270 RTCP = 0                    ' RTC base port
280 DOWP = RTCP+12              ' day of the week port
290 CDP = RTCP+13               ' Control port D
300 CEP = RTCP+14               ' Control port E
310 CFP = RTCP+15               ' Control port F
320 '
330 ' Get the clock ready to be set
340 '
350 OUT CEP,0                   ' STND output on - 64Hz
360 OUT CFP,1                   ' Reset
370 OUT CFP,4                   ' Set 24-hour mode
380 OUT CDP,5                   ' Set HOLD and IRQ flag
390 '
400 ' Set the clock from date/time in DT$.  At this point, I should
410 ' mention that from the base port+11 to base port+0 the date/time digits
420 ' are as follows:  YYMMDDHHMMSS.  Therefore, a simple FOR-NEXT loop can
430 ' be used to set (or read) the clock.
440 '
450 IF INP(CDP) AND &H2 THEN 450 ' Wait for not busy
460 '
470 N = 1
480 FOR P = 11 TO 0 STEP -1     ' Go from 11 to 0, counting backwards
490     DG = ASC(MID$(DT$,N,1)) ' Get binary digit
500     OUT RTCP+P, DG          ' Set digit
510     N = N+1
520 NEXT P
530 '
540 OUT DOWP, DOW               ' Set the day of the week
550 '
560 ' Start the clock
570 '
580 P = INP(CDP)                ' Get ctrl reg D
590 OUT CDP, P AND &HE          ' set HOLD off
600 '
610 ' Done, end program
620 '
630 PRINT: PRINT "Done": END
1000 '
1010 ' This routine computes the day of the week from date in D$
1020 '
1030 B$="3128313031303131303130313031"
1040 '
1050 CS=1
1060 Y=VAL(LEFT$(D$,2))+1900:M=VAL(MID$(D$,3,2)):D=VAL(RIGHT$(D$,2))
1070 Y1!=365.25*(Y-1)
1080 IF Y/4=INT(Y/4) AND M<3 THEN CS=CS-1
1090 M1=0
1100 IF M=1 THEN 1130
1110 FOR X=1 TO M-1:M1=M1+VAL(MID$(B$,X*2-1,2)):NEXT X
1120 '
1130 D1=D-1:T!=Y1!+M1+D1:T1=INT((T!/7-INT(T!/7))*7+.48)+CS
1140 IF T1>7 THEN T1=T1-7
1150 DOW = T1-1
1160 RETURN
1170 '
1180 ' Define the names of the days of the week to be read into DOW$(n)
1190 '
1200 DATA "Sunday","Monday","Tuesday","Wednesday"
1210 DATA "Thursday","Friday","Saturday"
```

Listing 2. TIMESET.BAS. The clock/calendar board requires support software in order for you to reset the time or date. This program is written in Microsoft BASIC for use under CP/M.

PC board and software source

This article provides sufficient information for a reasonably skilled technician to build the RTC board with little difficulty. However, you might not wish to tackle manufacturing the PC board itself. We will supply the etched and plated board, ready for installation of parts, at a price of $19.95 prepaid. (That includes postage and handling to U.S. addresses.)

We cannot supply assembled boards or supply the needed parts. However, for an additional price of $9.95, we will supply an H17 hard-sectored dual-format (HDOS and CP/M) diskette with the software mentioned above, already assembled, along with our HDOS and CP/M versions of our expanded RTC maintenance program, with source code.

The expanded RTC maintenance program is a menu-driven program written in 8080 assembly language. It includes provisions for setting the clock, reading it, and correcting it when the error is within ±30 seconds. We will also include the PROLOGUE.SYS program for automatic date entry under HDOS. We will supply this diskette as a separate item, without the PC board, for $14.95.

(In Texas, add 7.25% sales tax to all prices).

Order (by mail only) from:
Horn Engineering Associates
1714 Patricia Lane
Garland, TX 75042 Δ

Supplier Notes

Zenith's New 80386 Machine Takes the Lead Over IBM

Zenith Data Systems is aiming for March delivery of the Z386 announced in November. ZDS says the new computer is two to three times as fast as the Z248, about eight times as fast as a Z158, and almost 12 times as fast as an IBM Personal Computer.

The Z386 is targeted at applications such as desktop publishing, local-area networks, program development, artificial intelligence, and computer-aided design. MS-DOS 3.2 and Microsoft Windows will be shipped with the Z386, which can also run Xenix.

The suggested retail price is $6,499 with a 40-megabyte hard disk, a 1.2-megabyte floppy disk drive, serial and parallel ports, a megabyte of RAM, six open expansion slots, and a 195-watt power supply. A version with an 80-megabyte hard disk lists at $7,499.

Maximizing speed

The Z386 is designed around a 32-bit 80386 microprocessor with a clock speed of 16 MHz. ZDS has used four techniques to let the 80386 take maximum advantage of this speed, and spend minimum time waiting for access to slower memory chips. (ZDS estimates that use of wait states can slow down a processor by as much as 30%.)

The first technique capitalizes on special dynamic RAM chips that require less access time when consecutive addresses are being read within a single "page." The Z386 contains circuits to recognize this favorable, and common, condition—and thus avoid unnecessary wait states.

Being of the "dynamic" variety, Z386 RAM must be periodically "refreshed"—a disadvantage compensated for by lower cost and lower power requirements than "static" RAM. The second Z386 speed-maximization technique involves refreshing multiple rows of memory at once, thus reducing the amount of time the 80386 is occupied with memory-refresh functions.

The Z386 basic input/output system (BIOS) is stored in read-only memory (ROM) while power is off. Zenith's third trick to boost the speed of the Z386 is invoked when power is turned on: The BIOS is loaded into RAM to gain faster access time. ZDS claims this improves video response by 75% to 150%. Since ROM is the home of firmware and RAM is the host of software, ZDS calls the BIOS code transferred from ROM to RAM "slushware."

(A further advantage of slushware is that it can be updated from a floppy disk each time the computer is used, while firmware updates require installation of new ROM chips.)

The fourth speed-enhancement technique involves an extra-cost option. The Z386 will support 16K or 64K of cache memory using fast static RAM chips that *never* need wait states. This option is said to improve system performance by up to 40%.

Expansion potential

The Z386 cabinet can accommodate a total of two half-height and two full-height drives. The configuration characteristics of 38 varieties of hard disks are already stored in ROM; the user can also enter the specifications for other types of hard disks.

The Z386 expansion bus is designed for compatibility with 8- or 16-bit circuit cards designed for the IBM Personal Computer or IBM PC AT. There's also provision for an 80287 or 80387 mathematics co-processor.

Compatibility and software issues

The Z386 has obviously been designed for maximum compatibility with hardware currently on the market. It's too soon to judge how compatible it might be with an 80386-based computer from IBM—which has not yet announced any such machine.

Neither ZDS nor Compaq Computer Corp. waited for IBM to lead them into the 80386 marketplace. The two principal vendors of IBM-compatible microcomputers are no longer playing follow-the-leader.

That's pleasing, but perhaps not surprising. The 80386-based computers may turn out to resemble minicomputers at least as much as they do microcomputers. And IBM has never dominated the minicomputer market—doing well only in the corporate sector.

The Z386 initially will be running the same software as the Z248—albeit significantly faster. Development of programs to take advantage of the 80386 has already begun. Some software may be transferred from the minicomputer realm—that, after all, is where Xenix, as an implementation of Unix, has its origins. In minicomputers, the three big letters are not I-B-M, but rather D-E-C. Unix and other software originally run on Digital Equipment Corp. minis may make the Z386 seem like old times to users of the Heath Disk Operating System—that is, if they can afford the new price tags.

Circle #173 on Reader Service Card

S & K Technology, Inc.
Quality Software for Heath/Zenith Microcomputers

For the Z100...

WatchWord® **$100.00**

The ultimate in word processing with speed and power. See subscripts, superscripts, underlining, and boldface directly on the screen. Create your own fonts and special characters. Other features include centering, formatting, automatic horizontal scrolling with long lines, large file capability, split screen, macros, color, and an extensive configuration facility. See reviews in Remark (July 1985) and Sextant (Jan-Feb 1985, Sep-Oct 1985). Requires 192K RAM.

The Resident Speller™ **$100.00**

Spelling checker for use with WatchWord.
Checks as you type from inside WatchWord or checks a file.
Includes a 50,000 word expandable dictionary.
Requires 192K RAM to check a file.
Requires 300K RAM to check as you type.

Demo disk for both **$ 3.00**

For IBM compatibles including the Z150 and Z200 series...

PC WatchWord® (New) **$ 99.95**

The ultimate in word processing for the sophisticated user. Most of the features of the Z100 version except for screen fonts. Requires 256K RAM.

PC Resident Speller™ **$ 99.95**

Spelling checker for ASCII files such as those created with WatchWord, WordStar, WordPerfect, PeachText, and VolksWriter. Includes Strike. Requires 256K RAM.

Strike™ **$ 49.95**

Adds as-you-type spelling checking to your word processor. Works with the word processors above and also with DisplayWrite, MultiMate and PFS:Write. Requires 100K RAM in addition to that used by your word processor.

Demo disk for Strike and The PC Resident Speller **$ 2.00**

Demo disk for PC WatchWord **$ 2.00**

Texas residents please add state sales tax.

S & K Technology, Inc., 4610 Spotted Oak Woods, San Antonio, Texas 78249, (512) 492-3384

Circle #230 on Reader Service Card

$9 $9 $9
DISKETTES

Double Sided, Double Density; Hub Rings, Write tabs, Rainbow labels.
Soft Sector: Precision by Xidex, with $1 rebate.
Hard Sector: Wabash.

HARD SECTOR Single Sided, Double Density. $ 8.00 for ten. By Nashua.

Z-150/PC Winchesters

We now carry complete Winchester systems for your Z-150 or IBM compatible computer. 20 Megabyte systems. Shipment via UPS.

Z-150 or PC $ 449.00 + $10 Shipping
Z-240 or AT $ 389.00 + $10 Shipping

Ribbons

Ribbon Refills w/ Gloves

#7201	Epson MX/FX/RX, MPI, Star (except Gemini)	$ 3.00
#72011	As above, RED	$ 3.50
#72012	As above, GREEN	$ 3.50
#72013	As above, BLUE	$ 3.50
#7202	NEC-8023, C.Itoh 8150	$ 2.50

Cartridges

#7203	Epson MX/FX/RX-80	$ 6.00
#7206	Epson MX/FX/RX-100	$ 8.50
#7204	NEC-8023, C.Itoh 8150	$ 5.00
#7207	Diablo Multistrike	$ 3.75

Ribbon Spools

#7205	Star SG/Gemini,Okidata	$ 2.50

Please add $2.00 shipping to your ribbon or diskette order for shipping & handling.

LINDLEY SYSTEMS 21 Hancock St.
Bedford, MA 01730-1613
(617) 275-6821

Circle #118 on Reader Service Card

Classified Ads

Hardware

Z100 all-in-one, dual floppies, 8087 co-processor, 64K video, ROM 2.0, 768K on board, 256K in S-100, green monitor, technical manuals, and much software. $2,200. 217/398-1765.

Z100 low-profile, 10-MB hard disk, speed chip, 768K memory, monitor. Accounting, spreadsheet, word processing, and game software. $2,500 or best offer. Joe Noth, 312/638-4880.

H/Z37 soft-sector controller, cables, software, $165; TEAC 80T/DS drives, $110; modem, cable, software, $40. 512/479-0383.

H89A, 64K, manuals, 5¼" drive, dual 8" drive, Magnolia systems, $900; plus two H25 high-speed printers, $350 each. Matt or Jeff, 703/527-3140.

FOR SALE: H/Z100, like new. Full RAM, two 5¼" disk drives, all user manuals and technical manual set. Includes amber monitor and cable. Asking $750. Call 203/368-2332 days; ask for Jim.

Z100 dealer demo. Two 5¼" floppies. 96K video RAM, 448K DOS RAM, 8087, TAXAN color monitor, software. $1,500/best offer. 707/937-5001.

Software

PRINTER CONTROL. "COM" programs to control your printer from keyboard. MS-DOS/CP/M versions. Tell me printer, operating system. $25. CUSTOM PRINTER FONT(S) for printers that support "downloaded" characters. No program over $25. Visa and MC. Custom Computer Service, 503/760-4690, 7466 S.E. 112th, Portland, OR 97266.

Information

PERSONAL COMPUTER OWNERS can earn $1,000 to $5,000 monthly selling simple services performed by their computer. Work at home—in spare time. Get free list of 100 best services to offer. Write: A.I.M.B.G., P.O. Box 60369, San Diego, CA 92106-8369.

How to Order a Classified Ad

To get in touch with your fellow Heath/Zenith users, place your short notice in *Sextant*'s classified section. The rate is only 75¢ per word, with a minimum of 15 words.

Please omit all *specific* references to software, unless the package is unopened. If unopened, please specify.

Send your typewritten ad and payment to: Sextant, Classified Ad Department, 716 E Street S.E., Washington, DC 20003. Please include your name and phone number for our records.

Deadline is March 19 for the May-June issue and May 21 for the July-August issue.

TaxAide

Income tax preparation worksheets for use with your Lotus 1-2-3.

● PRODUCES IRS APPROVED PRINTOUTS - NO SPECIAL FORMS TO BUY ●

● Easy to Use — Menu Driven — Integrated ●

● Screen Displays Resemble Actual IRS forms ●

● Automatically Calculates Income Tax ●

● Full Technical Support — Satisfaction Guaranteed ●

TaxAide Plus — Provides worksheets for Forms 1040, 1040A, 2106, 2119, 2210, 2441, 3468, 3800, 3903, 4562, and 6251; Schedules 1, A, B, C, D, E, F, G, R, SE, and W; plus IRS worksheets. Multiple Forms 2106 and 4562 and Schedules C and SE. TAXAIDE PLUS PRODUCES IRS APPROVED PRINTOUTS FOR ALL FORMS AND SCHEDULES, INCLUDING 1040 AND 1040A. Ideal for income tax preparers. **$59.95**

TaxAide Personal — Provides worksheets for Forms 1040, 1040A, 2106, 2441, and Schedules 1, A, B, D, G, R, and W, plus IRS worksheets. Two Forms 2106 are provided. Produces IRS approved printouts (except Forms 1040 and 1040A). **$29.95**

REQUIRES ONLY 192K of RAM — If you have more memory, you may still run your background program such as SideKick or Perks.

Requires Lotus 1-2-3 Release 1A or later, and DOS 2.0 or later.

To order, send check to:
Kansas residents add 5% sales tax

Software Applications of Wichita
2204 Winstead Circle
Wichita, KS 67226

For VISA or MasterCard orders, call (316) 684-0304.

TaxAid is a trademark of Software Applications of Wichita
Lotus and 1-2-3 are registered trademarks of Lotus Development Corp
SideKick is a trademark of Borland International Inc
Perks is a trademark of Barry A. Watzman

Circle #189 on Reader Service Card

★ NOW AVAILABLE FOR C ★ QUICKBASIC ★ ★ IBM BASIC/BASICA ★ TURBO PASCAL ★

The **A**spen Systems **S**ubroutine **E**ditor (**ASE**) you can call from your programs. Design your own screen layouts - - update in several windows simultaneously. **ASE** is:

- ★ **TRANSPORTABLE** - can be configured for any keyboard and almost any computer or language under MSDOS.
- ★ **VERSATILE** - customize input for any application.
- ★ **COMPLETE** - with full screen edit capabilities and a wide variety of automatic conversions.
- ★ **EASY TO USE** - data and screen layouts described in a single map.
- ★ **FULLY DOCUMENTED** - including examples in BASIC, PASCAL, FORTRAN, C, and even COBOL.
- ★ **AFFORDABLE-**
  ASE is still only..... **$99**
  DEMO (See what ASE can do for you!)..... **$ 3**

The **A**spen Systems **S**ubroutine **P**ackage (**ASP**) - the companion package for **ASE** - with many functions unavailable or difficult to perform in high level languages. Like **ASE, ASP** is:

TRANSPORTABLE ★ FULLY DOCUMENTED
EFFICIENT ★ AFFORDABLE

ASP includes 150+ subroutines: conversions; sorts; string, bit, date/time functions; decimal arithmetic, and **MORE**.

ASP is still only..... **$130**

ASE and **ASP** include support and demo programs.

Prices are PPD (continental USA).
Colorado Residents add 3%.

P. O. Box 1163
Grand Junction, CO 81502
(303) 245-3262
VISA/MasterCard accepted

ASPEN SYSTEMS

CP/M and MS-DOS are trademarks of Digital Research and Microsoft, respectively.

Circle #149 on Reader Service Card

ZENITH | data systems

COMPUTERS

RAM Technology carries a full line of Zenith computers, peripherals, and software. Call us toll-free for competitive prices on systems and accessories.

VIDEO

Paradise Auto Switch EGA		$429.00
Video 7 EGA Deluxe		$429.00
Video 7 EGA High-Resolution Color Card		$369.00
Video 7 MGA High Res. Monochrome Graphics		$189.00
NEC Multisync High Res. Color Monitor		$599.00
C. ITOH CM1000 Color Monitor		$399.00
Mitsubishi EGA High Res. Color Monitor		$429.00
Premier Technologies Z148 1½-Slot Board		$109.00
ZVM-1220-A:	Non-Glare, Amber Monitor	$ 99.00
ZVM-1230-A:	Non-Glare, Green Monitor	$ 99.00
ZVM-1240:	Non-Glare, Amber Monitor, TTL	$159.00
ZVM-1200-1:	Tilt Swivel Base	$ 17.00
ZVM-1330:	High-Resolution Color, RGB	$459.00
ZVM-1360:	High-Resolution Color, RGB, Long-Persistence Phosphor	$609.00

DYNAMIC RAM MEMORY

4164	64K 150 NS.DRAM	QTY: 1-50:	$1.28
41256	256K 150 NS.DRAM	QTY: 1-50:	$2.90
41256	256K 120 NS. DRAM	QTY: 1-50:	$3.25

MODEMS

EVERCOM INTERNAL MODEM, 300/1200 Baud	$153.00
US ROBOTICS SPORTSTER 1200 (EXT)	$136.00
US ROBOTICS PASSWORD 300/1200	$199.00
US ROBOTICS MICROLINK 1200 W/Telpac	$239.00
US ROBOTICS MICROLINK 2400 W/Telpac	$389.00
US ROBOTICS COURIER 1200	$239.00
US ROBOTICS COURIER 2400	$389.00
US ROBOTICS VAR MODEM 1200 (INT.)	$136.00
US ROBOTICS VAR MODEM 2400 (INT.)	$198.00
US ROBOTICS COURIER 2400e	$439.00
US ROBOTICS COURIER HST (9600 baud)	$699.00

PC COMPATIBLE UPGRADE ACCESSORIES

INTEL ABOVE BOARD PC, 64K Expandable to 2 MB	$299.00
EVEREX MAGICCARD	$159.00
NEC V20 8 MHz Processor	$ 14.95
INTEL 8087-3 5 MHz. Co-Processor	$109.00
INTEL 8087-2 8 MHz. Co-Processor	$169.00
SMARTWATCH Clock/Cal. Module	$ 44.00
PRINTER CABLES, STANDARD PARALLEL, 6 Ft.	$ 22.00
SWITCHBOXES: 2 or 4 Position, 5 Yr. Warranty	$ 99.00
AST RAMPAGE EMS/EEMS w/256k, Software	$337.00
AST ADVANTAGE EMS/EEMS w/128k Serial, Parallel Ports, Software	$398.00

Z100 UPGRADE ACCESSORIES

C.D.R. Z100 Speed Module	$ 39.95
FBE RESEARCH ZMF-100A: Install Up To 768K On Z100 Motherboards #181-4917 Or Lower	$ 59.95
UCI Ramboard for Z-100, OK Expandable to 2MB	$ 299.00
SEAGATE 10 MB Winchester Kit, COMPLETE W/Zenith Contr., Hardware & Software	$ 999.00
W/CDR Contr., Hardware & Software	$ 899.00
SEAGATE 20 MB Winchester Kit, COMPLETE W/Zenith Contr., Hardware & Software	$1150.00
W/CDR Contr., Hardware & Software	$ 999.00
SYQUEST 10MB Removeable Media HD w/CDR Contr., Hardware, Software, and One Cartridge	$1248.00

PRINTERS

EPSON DX10 Daisy Wheel	$ 189.00
CANON LBP-8A1 Laser Printer	$2290.00
CANON A40 NLQ Dot Matrix, 140 cps, QUIET	$ 279.00
JUKI 6100 Daisy Wheel, 18 cps, parallel	$ 399.00
JUKI 6300 Daisy Wheel, 40 cps, ser/par	$ 749.00
OKIDATA ML182 Dot Matrix, 120 cps	$ 269.00
OKIDATA ML192 Dot Matrix, 160 cps	$ 399.00
TOSHIBA P321 3-in-1 par., 216 cps	$ 549.00
TOSHIBA P341 3-in-1 par., wide carriage	$ 899.00
C. ITOH Pro Writer Jr.	$ 259.00

Z200 UPGRADE ACCESSORIES

INTEL ABOVE BOARD AT, 128K, Expandable to 2 MB	$459.00
INTEL ABOVE BOARD AT PIGGYBACK, 128K; Expandable to 2 MB; Expands AB AT to 4 MB	$229.00
INTEL 80287 6 MHz. Co-Processor	$195.00
INTEL 80287 8 MHz. Co-Processor	$318.00
INTEL 80287 10 MHz. Co-Processor	$397.00
SEAGATE ST4026 20MB, 40 ms. avg.	$599.00
SEAGATE ST4038 30MB, 40 ms. avg.	$769.00
SEAGATE ST4051 40MB, 40 ms. avg.	$899.00
NEWBURY NDR 1085 85 MB, 30 ms. avg	$1799.00

Nashua — **Box of 10 With Lifetime Guarantee**

Nashua Diskettes: DS/DD, 48 TPI, Soft-Sectored or Hard-Sectored (Specify)	$9.50
Nashua Diskettes: DS/DD, 96 TPI, Soft-Sectored or Hard-Sectored (Specify)	$21.50
Nashua Diskettes: DS/HD, SS 600 Oersted Media for AT and Compatible 1.2 MB Drives.	$29.95

HARD DISK DRIVES

With One-Year Replacement Warranty

SEAGATE 10 MB Hard Disk With OMTI	$399.00
SEAGATE ST 225 20MB Hard Disk	$339.00
SEAGATE 20 MB HD w/OMTI	$459.00
OMTI/LAPINES 20 MB Hardcard	$479.00
SEAGATE ST238 30 MB w/OMTI RLL Controller	$559.00
SEAGATE ST251 50 MB Half HT HD w/OMTI Controller	$938.00
SYQUEST 10 MB Removeable Media Hard Disk Drive With OMTI Controller, Mounting Hardware, Cables and One Cartridge	$759.00
Additional Cartridges	$109.00

MITSUBISHI DISK DRIVES

FUJITSU M2551A: 5¼, Halt Ht, 48tpi, DS/DD	$112.50
MF501A: 5¼" HalfHeight, 48 TPI, DS/DD	$125.00
MF504A: 5¼" Half Height, 96 TPI, 1.2 MB	$159.00
M2896: 8" Half Height, 48 TPI, DS/DD, Shugart 850/860 Compatible (Limited Quantities)	$199.00

TERMS

Prices and specifications subject to change. Minimum 90-day warranty on all hardware. Personal checks held 10 working days; money orders accepted as cash. Please add 2% (minimum $2.00) for shipping; any surplus will be refunded. COD orders accepted; cash or cashier's check only. VISA/MC accepted; please add 2.8%. Purchase Orders accepted from businesses and educational institutions. User group inquiries invited. We appreciate your business!.

RAM Technology

427-3 AMHERST STREET, SUITE 265
NASHUA, NEW HAMPSHIRE 03063

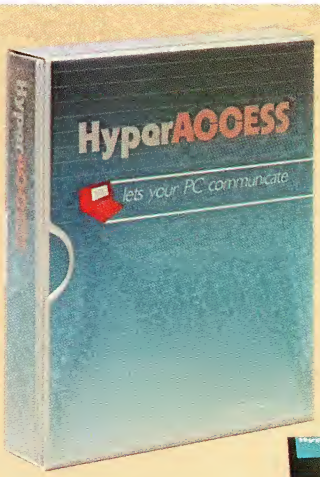
ORDER LINE: 1-800-662-0070
INFORMATION: (603) 889-0633

HOURS OF OPERATION: Monday-Friday, 9:00 A.M. - 5:00 p.m. EST

MasterCard

VISA

Circle #129 on Reader Service Card



HyperACCESS™

Top Rated Communications Software

Editor's Choice
PC MAGAZINE
October 28, 1986

"An excellent program with many advanced features, including a comprehensive language, unattended host and file transfer capabilities."

Rated #1 by
Software Digest RATINGS NEWSLETTER
September, 1986

"The consistent combination of power/usability ratings put HyperACCESS at the top..."

Rated ●●●● by
InfoWorld
July 14, 1986

"It's a snap to start using the program immediately... you can be communicating in a matter of minutes."

Whether you're just beginning to use your PC for communications or you've been frustrated by limitations of another program, HyperACCESS is the answer. Simple for novices. Exhilarating for experts. Ideal for businesses.

There's no initial hurdle. HyperACCESS **adapts itself** to your computer and modem (it dials, redials, and answers more than 40 models). You can use it just by looking at your screen. The manual is crystal clear. A detailed training program is included.

It comes ready to call CompuServe, Dow Jones, EasyLink, MCI Mail, NewsNet, The Source, and others (trial subscriptions included). Learns your passwords the first time you call and enters them for you from then on. You can list more than 100 computers (or people) for instant calling. HyperACCESS logs every call.

Astonishing versatility! Lets you link with systems that defy others. With mainframes, minis, micros, or RS-232C devices. It emulates VT52, VT100/102, TeleVideo 925/950, H19, TTY, Wang, IBM 3101, and IBM 3278 asynchronous terminals. It supports up to 19,200 baud and transfers files **FAST** using Kermit, Xmodem (CRC or Checksum), and ASCII Protocols.

HyperACCESS is an outstanding host, too. Even when you're not there, your PC can be accessed by callers who have passwords you've defined. You set whether each caller can read or type messages, transfer files, run programs*, or use your PC without restrictions.

HyperACCESS has the clearest, most complete script language, so you can create custom functions and menus, or automate any portion of a call. And we give you powerful scripts — transfer files between unattended PC's — pick up electronic mail at 2 am — act as a high-security dialback host, and more.

*Certain programs are incompatible with remote use.

Even in the midst of communications, HyperACCESS lets you run your other DOS software or use your computer's DOS commands. And HyperACCESS is so well-behaved, it can also run under Windows, TopView, DESQview or DoubleDOS, concurrently with other programs.

Call or Write Today!
800-826-2760 or (313) 243-0576

☐ Send HyperACCESS on 5¼" disks for $149
☐ Send HyperACCESS on 3½" disks for $149
☐ Send HyperACCESS on 5¼" *and* 3½" disks for $169
☐ Send me a demo disk for $5 (specify 5¼" or 3½")
30-Day Money-Back Guarantee

Also available on 3½" disks. Includes PC-to-Laptop utilities.

Name: _____

Company Name: _____

Shipping Address: _____

City: _____

State: _____ Zip: _____

Payment: ☐ Check ☐ VISA ☐ MC Card Exp. Date: _____

Credit Card #: _____

$149 per copy plus $5 shipping, $20 overseas; Mich. residents $6 sales tax.
System Requirements: IBM PC, XT, AT, or compatibles, 192K RAM min. PC-DOS 2.0 or greater. (Separate Z-100 version.) **Not copy protected.**

Hilgraeve Inc.
P.O. Box 941, Monroe, MI 48161
Communications Software Since 1981.

HyperACCESS, trademark of Hilgraeve; IBM, PC, XT, AT, TopView, trademarks of International Business Machines; MS, Windows, trademarks of Microsoft; Software Digest, Ratings Newsletter, trademarks of NSTL, Inc.; InfoWorld, publication of CW Communications, Inc.